

# ESSAYS IN BEHAVIORAL ECONOMICS

EXPERIMENTAL STUDIES ON MORALS AND COOPERATION

DISSERTATION

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presented by

YAGIZ ÖZDEMİR

from Germany

approved in October 2016 at the request of

Prof. Dr. Ernst Fehr  
Prof. Dr. Roberto A. Weber



The Faculty of Business, Economics and Informatics of the University of Zurich hereby authorizes the printing of this dissertation, without indicating an opinion of the views expressed in the work.

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## INTRODUCTION

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The duality of the major contributions of Adam Smith, the founding father of modern economic science, is emblematic for the relationship between economics and morality. While in *The Wealth of Nations* Smith introduces his idea of the invisible hand, laying the foundations of modern economic theory, in his other major work, *The Theory of Moral Sentiments*, he provides a theoretical framework for the moral underpinnings of human behavior. The interaction between economic institutions and morality has been controversially debated across the social sciences for centuries. Some scholars have argued that moral virtues such as responsibility, trust, integrity, and justice are prerequisites for a proper functioning of free market institutions or can be fostered by market exchange (Montesquieu, 1989/1748; Paine, 1969/1792; Smith, 1979/1776). Smith (1896/1763) notes that “whenever commerce is introduced into any country, probity [...] always accompanied it. [...] Where people seldom deal with one another, we find that they are somewhat disposed to cheat because they can gain more by a smart trick than they can lose by the injury which it does to their character” (pp. 253-254). Others have stressed the destructive role of markets, which have been blamed for prioritizing self-interest over the public good, destroying moral authority, and corroding traditional non-market institutions (Hirsch, 1976; Marx, 1957/1867; Schumpeter, 1994/1942). According to Hirsch (1976) “the social morality that has served as an understructure for economic individualism [...] has diminished with time and with the corrosive contact of the active capitalist values” (pp. 117-118).

Despite being historically entwined with the discipline of economics, the subject of morality has been largely ignored by mainstream neoclassical economics, which typically rests on the assumption of self-regarding individuals, who derive utility only from their own financial and non-financial payoffs. However, discovering patterns in moral decision making, understanding the influence of economic institutions on moral values, and studying the emergence of moral principles potentially have important implications for economic theory. Incorporating morality into economic analysis can lead to a more complete account of human behavior and thus help to improve predictions about prevailing market outcomes. Moreover, studying the effects of economic institutions on moral values might change our approach to classical welfare analysis, which takes preferences as given. Furthermore, understanding moral behavior can contribute to engineer more efficient norm enforcement mechanisms, taking into

account the internal moral constraints of agents. Finally, promoting moral values can possibly be a more efficient method to achieve cooperation than relying solely on external constraints such as punishment, since “in a complex world the government is not likely to be in a good position to calculate and charge the optimal vector of prices to eliminate unwanted behavior” (Stringham, 2011, p.100). With the dawn of behavioral and experimental economics, the profession has developed methodological tools that enable us to study questions of morals and cooperation using a more data-driven approach.

This dissertation consists of three independent research papers, which – taking such a data-driven approach – use experimental methods to study morals and cooperation from the perspective of economic science. [Chapter 2](#) and [Chapter 3](#) study whether and through which channels market institutions affect morality. [Chapter 4](#) focuses on the relative performance of different norm enforcement institutions in resolving social dilemmas.

In [Chapter 2](#) we reassess the claim, put forward in the pioneering experimental study of Falk and Szech (2013), that markets erode moral values. Our study provides three major findings, which taken together draw a more optimistic picture of markets with respect to their influence on morality than suggested by the study of Falk and Szech (2013). First, inherent features of market institutions are not responsible for the erosion of morality in the market treatments of Falk and Szech (2013). The erosion of morality can instead be explained by an experimental confound in their treatment comparison. Second, morality remains robust even in competitive market environments where agents cannot enforce prosocial outcomes by refraining from immoral transactions. Third, the availability of social information in markets leads to an improvement of moral standards over time. By providing evidence not only for the robustness but also for the potential improvement of moral behavior in markets, our results call for a reconsideration of the conclusions drawn from the study of Falk and Szech (2013).

The resilience of moral behavior against competitive forces is particularly intriguing. Intuitively, competition allows for the replacement excuse, the argument that “if I don’t do it, someone else will”. Under competition, the decision of a single market participant to refrain from trade does not necessarily prevent the negative consequences of the transaction. If a market participant decides not to engage in an immoral transaction, the negative externality might be triggered by a competitor who steps in and concludes the trade nonetheless. From the normative standpoint of utilitarian ethics, the replacement excuse provides justification for any action because only outcomes matter for ethical assessment. Deontological ethics, in contrast, judges an action with respect to its adherence to a principle, irrespective of outcomes.

Economic theory is predominantly based on the assumption of consequentialist agents who focus only on expected outcomes.

To test this assumption we take an experimental approach in [Chapter 3](#) and address the question under which conditions the replacement excuse leads to the erosion of moral behavior in competitive markets. We show in a series of laboratory and online experiments that the force of the replacement excuse depends on the social norm associated with the underlying action. We find that subjects do not follow the replacement excuse if the prevailing social norm classifies the underlying action as inconsistent with moral behavior. In these cases many subjects do not take the action, even if its omission will probably be replaced by someone else, so that the immoral outcome will be induced nevertheless. However, many subjects who would not take the action if its omission could not be replaced take the action under the shadow of replacement if no mutual understanding exists whether the underlying action is consistent or inconsistent with moral behavior. Our results enhance our understanding of the effects of competitive institutions on moral behavior by providing insights into the power and the limits of the replacement excuse.

[Chapter 4](#) shifts the focus from the effects of markets on morals to the resolution of social dilemmas, which arise whenever it is a dominant strategy for agents to make a socially defective choice, but everyone is better off if all agents choose the socially cooperative alternative. Understanding how cooperation can be sustained in social dilemmas is important because "social dilemmas are found in all aspects of life, leading to momentous decisions affecting war and peace as well as the mundane relationships of keeping promises in everyday life" (Ostrom, 1998, p.1).

In particular, [Chapter 4](#) studies the relative performance of different norm enforcement institutions in sustaining cooperation under monitoring environments that are more realistic than those considered in the previous literature. Specifically, we introduce private imperfect monitoring and information acquisition to public goods games with punishment. A comparison between centralized and decentralized social norm enforcement reveals a tradeoff between Type I errors of punishment (sanctioning a cooperator) and Type II errors of punishment (failing to sanction a defector). Decentralization achieves significantly higher cooperation rates than centralization, suggesting that centralized social norm enforcement institutions per se, without being associated with other performance-enhancing features, are not as effective as peer-to-peer punishment institutions in resolving social dilemmas. Moreover, we find substantial demand for additional information about the contribution decisions of other group members. By establishing a "standard of proof" before exerting punishment, subjects reduce Type I errors of punishment, boosting cooperation rates

as compared to an environment where costly information acquisition is not possible.

The findings of the three independent research projects are all related to the broader research agenda on prosocial behavior. A large body of empirical evidence on prosocial behavior suggests that the predictions of neoclassical economic models can sometimes be substantially misguided if they rest on the assumption of purely self-regarding behavior, as the following examples show. In ultimatum games, offers perceived as unfair are frequently rejected (Oosterbeek, Sloof, and Van De Kuilen, 2004), and bargaining processes often stall, because agents do not always follow the actions that are in their best pecuniary interest (Babcock and Loewenstein, 1997). In one-shot dictator games subjects tend to give a substantial portion of their endowment to the receiver (Engel, 2011). Instead of focusing only on actual prices of products, subjects also consider whether reasons for price changes have been fair (Kahneman, Knetsch, and Thaler, 1986). Unjustified wage reductions cause lower effort levels, giving rise to the phenomenon of downwards wage rigidity (Bewley, 1999; Fehr and Falk, 1999; Fehr, Kirchsteiger, and Riedl, 1993). In social dilemma situations subjects are willing to cooperate if other group members are also willing to do so, although defection represents a strictly dominant strategy in financial terms. Costly punishment toward norm violators is frequently exercised, even in one-shot situations (Fehr and Gächter, 2000). Cheap talk promises and threats can be highly effective in practice (Ellingsen and Johannesson, 2004), and many individuals feature an aversion to payoff-increasing lies, even though anonymity is guaranteed and punishment is impossible (Fischbacher and Föllmi-Heusi, 2013; Gneezy, Rokenbach, and Serra-Garcia, 2013).

Prosocial behavior has been predominantly studied based on some notion of consequentialist preferences. However, the results of [Chapter 2](#) and [Chapter 3](#) demonstrate the importance of understanding norm-based moral behavior that is focused on actions and insensitive to changes in expected outcomes. How can moral behavior be distinguished from other types of prosocial behavior? A consensual definition of morality does not exist. In contrast to moral philosophy, where morality is considered from a normative point of view, the social sciences typically consider morality in a positivist sense, describing certain codes of conduct put forward by society, groups, or individuals. While morality rests on a certain code of conduct, other types of prosocial behavior, such as altruism<sup>1</sup>, are not necessarily related to underlying norms. Several typologies of norms have been proposed to distinguish moral norms from other types of norms, including most notably the typologies of Turiel (1983), Elster (2006), and Bicchieri (2006).

<sup>1</sup> Prosocial behavior is called altruistic if it is based on a utility function that is increasing in the well-being of other individuals.



Turiel (1983) proposed an influential typology based on a distinction between moral and conventional norms. According to Turiel (1983) a defining feature of moral norms is the intrinsic effects of the underlying actions on the well-being of other persons. Hence, morality is centered around concepts of harm, welfare, and fairness. On the other hand, conventions do not have intrinsic interpersonal consequences and only provide means of efficient social exchange. The transgression of conventional norms is deemed less serious than the transgression of moral norms.

Elster (2006) distinguishes moral, quasi-moral, and social norms based on the emotional reaction that is triggered by a violation of the norm. The violation of moral norms simultaneously trigger guilt in the violator and anger in the observer of the norm violation. In contrast to moral norms, social norms do not trigger any response in the norm violator if the norm violation is not observed. Social norms instead trigger contempt in the observer of the norm violation, and the observation of the contempt in turn triggers shame in the norm violator. According to Elster (2006) moral norms include for example "the norm to share equally, the norm to keep promises, the norm to discover the truth when it matters to do so, the norm to tell the truth or at least not to lie, the norm to help others in distress" (p. 371). Besides moral and social norms, Elster (2006) defines a third category of norms, quasi-moral norms, which are followed even in the absence of any observers, but are conditional on the behavior of other agents. Examples for quasi-moral norms include the norm of reciprocity and the norm of conditional cooperation, which is studied in [Chapter 4](#).

Bicchieri (2006) considers conventions as equilibria of coordination games, which do not involve any conflict between compliance with the norm and self-interest. In contrast, compliance with social norms often clashes with self-interest. According to her theory, the willingness to comply with social norms is conditional on both a shared belief that compliance is expected and the compliance of other group members. Because of the preference for conditional norm compliance social dilemma type situations are transformed into coordination games. While compliance with social norms is conditional on normative and empirical expectations about the beliefs and actions of other group members, moral norms are followed unconditionally. In the typology of Bicchieri (2006), norms of cooperation, reciprocity, and fairness are classified as social norms, because they do not trigger sufficiently strong emotional responses of repugnance to be followed unconditionally.

More research is needed to identify proper natural kinds in the context of behavioral norms and prosocial behavior in general. In this manuscript the terms moral and social norms are used interchangeably – while the term moral norms is used to emphasize the severity of the norm violation, the term social norm is used to emphasize

the shared understanding of proper behavior. Many open questions remain about the nature of norms, especially about the relation between norms and preferences, the emergence of behavioral norms, and their evolution. Future research in this field will certainly benefit from sophisticated tools for measuring social norms that have been developed recently (Krupka and Weber, 2013). Ultimately, a better understanding of norm-based behavior will not only improve predictions about behavior and outcomes in economically relevant settings, but also help to design interventions that can establish new behavioral norms or affect the dynamics of existing ones in desirable ways.

## ABSTRACT

In a pioneering study Falk and Szech (2013) show that subjects interacting in a market environment are substantially more likely to accept an immoral act for a given payment than subjects in an individual decision context. In this paper we reassess the claim that markets undermine morality by examining several potential causes for the deterioration of moral values in the market. We provide three major findings, which call for a reconsideration of the conclusions drawn from the study of Falk and Szech (2013). First, inherent features of market institutions are not responsible for the erosion of morality in the market treatments of Falk and Szech (2013). The erosion of morality can instead be explained by the unequal number of decision periods between treatments. Second, morality remains robust even in competitive market environments where agents cannot enforce prosocial outcomes by refraining from immoral transactions. Third, the availability of social information in markets leads to an improvement of moral standards over time.

[Once capitalism] convinces everyone that it can dispense with morality and public spirit, the universal pursuit of self-interest being all that is needed for satisfactory performance, the system will undermine its own viability which is in fact premised on civic behavior and on the respect of certain moral norms.

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Hirschman (1984) on Hirsch (1976)

Commerce is a cure for the most destructive prejudices; for it is almost a general rule that wherever we find agreeable manners, there commerce flourishes; and that wherever there is commerce, there we meet with agreeable manners.

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Montesquieu (1989/1748)

## 2.1 INTRODUCTION

The quotes in the epigraph reflect two conflicting perspectives on a long-lasting question that has been controversially debated across a variety of disciplines in the social sciences – how do market institutions affect moral values? On the one hand, scholars have considered markets as moralizing institutions, which cordialize mankind by civilizing manners and enhancing moral virtues (Montesquieu, 1989/1748; Paine, 1969/1792; Smith, 1979/1776). On the other hand, markets have been blamed for their tendency to prioritize self-interest over the public good, destroy moral authority, and corrode traditional non-market institutions (Hirsch, 1976; Marx, 1957/1867; Schumpeter, 1994/1942). This fundamental discussion about the effects of markets on moral values has been revived recently in both philosophical debate (Sandel, 2012) and experimental work (Bartling, Weber, and Yao, 2015; Falk and Szech, 2013; Kirchler et al., 2015). In a pioneering study Falk and Szech (2013, henceforth F&S) show that subjects interacting in a double auction market are substantially more likely to accept an immoral act for a given payment than subjects in an individual decision context. However, the underlying mechanisms for the erosion of moral values in the market treatment of F&S remain unknown. In this paper we reassess the claim that markets undermine morality by examining several potential causes for the deterioration of moral values in the market treatment of F&S. We are in particular interested

in the question whether features that are intrinsically and inevitably associated with markets are responsible for the deterioration of moral values or whether the result in F&S is due to the specific way in which they have set up their experiment.

Empirical evidence on the relationship between markets and moral preferences is essential for gaining more comprehensive insights into the implications of an institution that is dominating economic life. If markets crowd out moral values, then traditional economic welfare analysis, which focuses on allocative efficiency under exogenously given (moral) preferences, is possibly incomplete. However, only the revelation of specific causal mechanisms will allow us to formulate useful predictions about the circumstances under which markets will exert their influence on moral preferences, how the effects of markets will compare to those of alternative institutions, and which policy measures are most likely to succeed with respect to desired outcomes.<sup>1</sup>

Our study provides three major findings, which taken together draw a more optimistic picture of markets with respect to their influence on morality than suggested by the study of F&S. First, the erosion of moral values in the market treatments of F&S is caused by an experimental confound that is not related to markets – the unequal number of decision periods between the individual and the market treatments. If the number of decision periods is held constant between treatments, the seemingly destructive effects of the market treatments on moral values cease to exist, suggesting that inherent features of market institutions are not responsible for the erosion of morality in the market treatments of F&S. Second, moral values of market participants remain robust against competition. The presence of competitors, who can replace the decision of a market participant to refrain from an unethical transaction, does not increase the propensity of subjects to engage in immoral trade. Our results highlight the resilience of morality in markets, even in environments where market participants cannot enforce prosocial outcomes by refraining from immoral transactions. Third, the availability of social information in markets leads to an improvement of moral standards over time. Observing the decisions taken by other agents in the market induces subjects to demand a higher price for accepting harm imposed on a third party. Since market interaction is inevitably associated with the transmission of information about the actions of other market participants, studying the influence of social information is important for a better understanding of morality in markets. By providing evidence not only for the robustness but also for the potential improvement of

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<sup>1</sup> Correlational evidence based on cross-cultural studies shows that the level of market integration, measured as the share of calorie intake acquired through the market, positively co-varies with prevailing fairness concerns in a society (Henrich et al., 2010); however, the direction of causality remains unclear.

moral behavior in markets, our results call for a reconsideration of the conclusions drawn from the study of F&S.

Why does morality erode in the market treatments of F&S? The key results of F&S are based on two treatments, a baseline condition, in which subjects make moral decisions individually, and a market condition, in which two subjects bargain over the split of a given surplus and make implicit moral decisions through their actions in the market, where an externality is imposed if subjects reach an agreement. While the individual treatment consists of a single period that determines the outcome with certainty, the market treatment is repeated for 10 periods, of which only one randomly selected period is implemented. However, there is little justification for introducing a potential confound by changing the elicitation method between treatments.<sup>2</sup> We show that markets do not affect morality if the number of decision periods is controlled for – reservation prices for accepting harm imposed on a third party neither differ between a single-period market treatment and a single-period individual treatment nor between a 10-period market treatment and a 10-period individual treatment. Specifically, by implementing a 2x2 between subject design, comprising a single- and a 10-period version of both the individual and the market treatments, we disentangle the potential effects of the elicitation method on reservation prices from those of the market institution. We confront subjects with the moral decision of either taking a payment for themselves or financing the surgery of a leprosy patient in India. Our findings suggest that reservation prices for accepting harm imposed on a third party are significantly lower in the repeated treatments than in the respective single-period variants, irrespective of the underlying context. Hence, the deterioration of moral values in the 10-period market treatment as compared to the single-period individual treatment is not related to the market institution, but can be fully explained by the unequal number of decision periods. Why does a multi-period interaction involving the random pay method lead to different moral decisions than a one-shot decision situation? In the individual treatment, a subject, who faces the choice between receiving a payment  $p$  or implementing the moral outcome  $M$ , compares the utility from the payment  $p$ ,  $u(p)$ , to the utility from the moral outcome  $M$ ,  $u(M)$ . In the repeated market treatment, subjects are likely to view each period as a separate decision task, instead of mentally integrating all 10 periods to form a reduced problem (Starmer and Sugden, 1991). If subjects focus only on a given market period, but take the implementation probability of 10% into account, then a subject in the repeated market treatment compares  $u(p, 10\%)$  to  $u(M, 10\%)$ . Exley (2016) shows experimentally that under risk the

<sup>2</sup> Although we started the study with the initial hypothesis that multi-period decision making with random pay will not substantially affect reservation prices for harm imposed on a third party as compared to a single-period decision situation, we controlled for the elicitation method to rule out a potential confound.

value of a donation is discounted disproportionately more than the value of an own financial gain. Hence, according to Exley's (2016) findings, if  $u(p) = u(M)$ , then  $u(p, 10\%) > u(M, 10\%)$  on average.<sup>3</sup> Based on the preceding reasoning, reservation prices for accepting harm imposed on a third party are expected to be lower in a repeated interaction with random pay than in a one-shot decision treatment, independent of the underlying institution.<sup>4</sup>

A plain bilateral bargaining environment rules out competition among market participants and therefore disregards a market feature that has been identified as a potential cause for the erosion of morals in markets (Falk and Szech, 2013; Shleifer, 2004). Since competition is characteristic of market institutions, the bilateral market treatment alone might lead to incomplete conclusions about the effects of markets on morality. To test whether competition crowds out moral values, we run competition treatments, where a monopolist, who can reach at most one agreement, bargains simultaneously with several competitors. We find that reservation prices for accepting harm imposed on a third party remain unaffected by competition; hence, moral values prove to be robust against competitive forces in markets. Our results appear surprising, because under competition the decision of a single market participant to refrain from trade does not necessarily prevent the externality induced by the transaction. If a market participant decides not to engage in a transaction, the negative externality might be triggered by a competitor who steps in and concludes the trade nonetheless. Therefore, competition generally reduces the expected social benefit of forgoing a profitable but immoral market transaction. If market participants use the replacement argument, "if I don't do it, someone else will", as an excuse for selfish behavior, competition might undermine moral behavior in markets. Such a replacement argument seems to have substantial impact on behavior in ultimatum games with responder competition. Research on ultimatum games has shown that responders are more likely to accept an unfair offer if competing responders exist who can "replace" the rejection decision of another responder (e.g. Fischbacher, Fong, and Fehr, 2009; Grosskopf, 2003).<sup>5</sup> Why does competition affect re-

<sup>3</sup> Exley (2016) suggests that subjects use risk as an excuse for choosing the selfish option, because the asymmetric response to risk occurs only if subjects face a tradeoff with respect to a payment to themselves. Moreover, selfish subjects are more likely to take excuse-driven choices in risky decisions than prosocial subjects and there is a correlation between excuse-driven behavior in risky decisions and in moral wiggle room tasks introduced by Dana, Weber, and Kuang (2007).

<sup>4</sup> To the best of our knowledge no study exists that directly compares the two methods in the context of moral decision making. In a meta study Engel (2011) finds that repetition has a clear negative effect on giving in dictator games, but random pay has a negative effect only in one specification of the regression analysis.

<sup>5</sup> In the ultimatum game with responder competition a proposer is matched with at least two responders. After the proposer makes an offer about how to split a surplus, the responders decide simultaneously whether to accept or reject the offer. If only



sponder behavior in ultimatum games, but not the willingness to engage in a transaction that harms a leprosy patient? The ultimatum game with responder competition differs from our experiment in at least one important aspect. While accepting an unfair offer in the ultimatum game is not considered as morally inappropriate, imposing harm on a leprosy patient by taking money for oneself constitutes an immoral act (Bartling and Özdemir, 2016). Therefore, responders who accept an unfair offer in the ultimatum game do not bear any moral costs as a consequence of their decision. If the expected benefit of rejecting an unfair offer – i.e., reducing the payoff of the proposer – decreases due to competition, responders react by increasing their willingness to accept. In contrast, subjects who break the norm of not harming a leprosy patient in India have to bear the moral costs of their action independent of the expected outcome. If subjects derive sufficient disutility from taking actions that do not comply with social norms of proper behavior (Krupka and Weber, 2013; Lindbeck, 1997; López-Pérez, 2008), the pecuniary benefits from immoral trade might be offset by the moral cost of breaking the social norm, and, hence, the possibility of being “replaced” by a competitor in the market might not affect the decision whether to refrain from an immoral transaction. Such moral costs might be triggered by self-image and identity concerns (Akerlof and Kranton, 2000, 2005; Bénabou and Tirole, 2004, 2006; Bodner and Prelec, 2003; Köszegi, 2006; Mazar, Amir, and Ariely, 2008), social image concerns (Akerlof, 1980; Andreoni and Bernheim, 2009; Ariely, Bracha, and Meier, 2009; Bernheim, 1994), or a desire for “warm glow” (Andreoni, 1989, 1990).

Bartling and Özdemir (2016) study experimentally the force of the replacement excuse in moral decisions, and show that if the underlying action is considered as socially and morally inappropriate, the prospect of being replaced by another agent does not affect the propensity of subjects to take a prosocial action. Our results add to Bartling and Özdemir (2016), because Bartling and Özdemir (2016) study the replacement logic in a simple non-market setting, raising the question whether their findings will carry over to more complex market environments. F&S introduce competition in a multilateral bargaining treatment, where nine sellers bargain simultaneously with seven buyers and each market participant can reach at most one agreement. F&S argue that “in markets with many buyers and sellers, diffusion of being pivotal for outcomes adds to moral decay” (p. 710), but the fraction of sellers willing to accept the immoral act for 10 EUR or less is only insignificantly larger in their multilateral bargaining treatment than in their bilateral market condition. However, there are potential

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one responder accepts the offer, the proposer and the accepting responder receive their respective shares. If more than one responder accepts the offer, the responder who receives the share is randomly determined among the responders who have accepted the offer. Only if all responders reject the offer, all players receive a payoff of zero.



ceiling effects, because more than 70% of subjects accept the immoral act for 10 EUR or less already in the bilateral market treatment. Moreover, F&S do not control for the additional social information that is transmitted in the multilateral bargaining treatment as compared to the bilateral bargaining setting. In contrast, we isolate the effects of competition by holding social information transmitted through the market constant between treatments.

Agents interacting in markets are usually exposed to information about the actions taken by other market participants, because either aggregate information is available, such as prices and market shares, or offers and decisions to buy or sell are directly observable. According to F&S, “observing others trading and ignoring moral standards may make the pursuit of self-interest ethically permissible, leading further individuals to engage in trade” (p. 708). We study how social information in markets affects morality by implementing a social information treatment, where the amount of information that subjects receive about the actions of other market participants is expanded. Reservation prices for accepting harm imposed on a third party in the social information treatment increase substantially over time and, despite competition, eventually reach significantly higher levels than in a comparable individual decision context. Descriptive social norms, i.e., expectations about the actual behavior of others, can explain substantial variation in other-regarding behavior (Bicchieri and Xiao, 2009; Cialdini and Goldstein, 2004; Krupka and Weber, 2009). By disseminating shared understandings of proper behavior in markets, the transmission of social information can improve morality in markets. F&S stress the potential detrimental effects of social information in markets on morality, but our results reveal a converse effect – agents who observe ethical behavior of other market participants are encouraged to take moral actions themselves.

Our paper is related to two experimental studies that examine moral behavior in markets, Bartling, Weber, and Yao (2015) and Kirchner et al. (2015). Bartling, Weber, and Yao (2015) study socially responsible behavior in posted-offer markets, where firms and consumers exchange either a low-cost product that creates a negative externality for another subject in the lab or a high-cost product that mitigates the externality. The more expensive, but socially responsible product attains a significant and stable market share. Moreover, concerns for social impact within a western subject pool are, if at all, only slightly lower in the market treatment than in a comparable individual benchmark – a result that stands in contrast to the substantial erosion of moral values reported by F&S.<sup>6</sup> In contrast, markets seem to

<sup>6</sup> While in Bartling, Weber, and Yao (2015) the frequencies of fair product choices in the market and fair choices in a comparable non-market context differ by 14%-points, a difference that is significant in only some specifications of the analysis, in F&S the fraction of subjects willing to accept harm imposed on a third party for 10 EUR or less differs by around 30%-points between the individual and market treatments.

have significantly detrimental effects on social concerns in a Chinese subject pool, raising the question how cultural factors interact with the effects of markets on moral values. However, due to fundamental differences in the underlying experimental designs, the results of Bartling, Weber, and Yao (2015) are not directly comparable to those of F&S. Kirchler et al. (2015) study the effects of different interventions on moral preferences, identifying two interventions that have beneficial effects on moral behavior, the threat of punishment and the removal of anonymity. However, because of their different research focus, Kirchler et al. (2015) do not compare moral behavior between an individual and a market context.<sup>7</sup>

The remainder of this paper is structured as follows. [Section 2.2](#) describes our experimental design that disentangles the effects of the underlying institution from those of the elicitation method; [Section 2.3](#) reports the respective results. [Section 2.4](#) presents the competition and social information treatments and the respective results. [Section 2.5](#) concludes.

## 2.2 EXPERIMENTAL DESIGN

We implement the moral decision in a novel way that provides both a morally charged decision context and simple administrative procedures. Subjects are told that their decisions will have consequences for a third party – a leprosy patient in India. If the moral outcome occurs, we donate CHF 60 (1 CHF  $\approx$  1.02 USD) to the Switzerland-based charity FAIRMED to finance the surgery of a leprosy patient. If the selfish outcome occurs, the funding for the surgery is not provided. We inform subjects that persons affected with leprosy suffer from disfigurements caused by the infection and that medical surgeries mitigate the mutilations, which are often associated with social stigmas. Moreover, subjects are informed that a basic surgery can be financed for around CHF 60 on average and that the donations will be used for this specific purpose.<sup>8</sup>

F&S compare a single-period individual treatment with a 10-period market interaction. This treatment comparison allows to identify only

<sup>7</sup> Kirchler et al. (2015) study interventions in both a market and an individual context, but since key parameters are not held constant between treatments, the results are not comparable.

<sup>8</sup> In the study of F&S, subjects face a choice between saving the life of a mouse or taking a payment for themselves. We use the leprosy paradigm, because i) its implementation is simpler to administrate and easier to replicate than the mouse paradigm, ii) since the study of F&S has received public attention, subjects might already be familiar with the mouse paradigm and the underlying research question, and iii) we can test whether the results of F&S transfer to a different domain of moral decision making. Bartling and Özdemir (2016) verify that the leprosy task provides a morally charged decision context – the decision to impose harm on a leprosy patient by taking a payment to oneself is rated as socially and morally inappropriate by 96.7% of subjects.

the combined effect of the market institution and the change in the number of periods. Hence, if behavior is affected by the repetition of the interaction, the unequal number of periods constitutes a potential confound. Focusing on the first period of the repeated market treatment does not sufficiently address this problem, because the reduced implementation probability of any given period or the ex-ante knowledge of the multi-period interaction might affect behavior. Therefore, to isolate the effect of markets we control for the number of decision periods by implementing a 2x2 between subject design (see Table 2.1), combining the underlying institutional environment (market or individual) with the number of periods (one-shot or 10 periods with random pay).

	One-shot	10 times repeated
Individual treatment	Individual (F&S)	Individual <sub>10</sub>
Market treatment	Market	Market <sub>10</sub> (F&S)

Table 2.1: Overview of treatments

In the *Market* treatment, two randomly matched subjects bargain over the split of CHF 20 following the rules of a continuous double auction. If the two subjects agree on how to split the CHF 20, the agreement is implemented, but the transaction imposes a negative externality on a third party – the funding for the surgery of a leprosy patient in India will not be provided. If subjects do not reach an agreement within three minutes, the market closes, both participants receive no additional payment, and CHF 60 will be donated for the surgery of a leprosy patient. Note that each subject can unilaterally enforce the moral outcome by neither posting nor accepting an offer. Both subjects can continuously make binding offers by posting how much of the CHF 20 they demand, while demands can consist of any integer between 0 and 20. To make a new offer subjects have to reduce their previously posted demand, and only the current (best) offer of a participant can be accepted. Subjects can observe their current demand, the history of their demands, the current offer of the other participant, and the history of the other participant's offers on their computer screens. After an agreement is reached, subjects have to wait until the three minutes have elapsed before being able to proceed with the experiment; this design feature rules out that subjects can reduce waiting time by accepting an offer. Our procedures differ from those of F&S with respect to the trial round that subjects play to get familiar with the rules of the continuous double auction and the graphical user interface. Due of a trial period in the market treatment, the timespan between the introduction of the externality to subjects and actual decision making is larger in the market treatment of F&S than in their individual treatment; hence, the emotional salience of the harm imposed on a third party might be lower in the market

treatment. In contrast to F&S, we distribute separate instructions for the trial round that include only information on how the continuous double auction works and the way offers are entered and accepted, but not on the externality. Only after the trial period is finished, subjects receive detailed instructions about the experiment, including a description of the externality. Since there is no trial period in the individual condition, this sequential introduction of instructions keeps the timespan between the exposure to the externality and subjects' decisions constant across treatments, and, thus, rules out that differences in the salience of the externality confound the results.

In the *Individual* treatment, the baseline to which moral behavior in the market is compared to, we use a price list to measure the reservation prices of subjects for accepting harm imposed on a third party. In the individual treatment of F&S there is only one subject, who can either take or not take 10 EUR, whereas in their bilateral market treatment there are two subjects, who bargain over the split of 20 EUR. Therefore, the set of possible distributions, the total surplus, and the number of players differ between the two treatments of F&S.<sup>9</sup> To keep these factors constant between treatments, we introduce two types of participants in the Individual treatment, an active decision maker and a passive recipient. Each active decision maker is matched with a passive recipient, who does not have any influence on the outcome, but can receive a share of the CHF 20. Since the two parties in the Market treatment can agree on one of 21 different distributions of the CHF 20, active decision makers in the Individual treatment face a list of all the 21 distributions that can emerge in the Market treatment and decide for each distribution whether to take the payment and thereby impose harm on a third party or to reject the payment. Afterwards, one of the 21 distributions is chosen at random and the decision for the selected distribution is implemented. If a subject has decided to take the payment for the randomly chosen distribution, the two participants receive their respective shares and the funding for the surgery is not provided. If, however, the payment has been rejected for the randomly chosen distribution, both participants receive no additional payment and the surgery is financed. Analogous to the procedures in the Market treatment, subjects have three minutes to make their decisions and must wait, in any case, until the three minutes have elapsed before being able to proceed with the experiment. Our approach has four advantages compared to the individual treatment of F&S. First, by introducing a passive participant we hold the financial surplus of subjects (20 CHF), and thus their combined costs of funding the surgery, constant between treatments. Second, the price list reflects the set of possible distributions that can emerge

<sup>9</sup> In two separate control treatments, F&S either use a price list or control for the existence of another participant, but they do not combine both features within a single treatment. Moreover, the set of possible distributions that can emerge in the market is not matched in any of their individual treatments.

in the market. Third, the number of involved individuals is constant between treatments. Forth, by using a price list we can determine the reservation prices of subjects more accurately than in a binary choice task.

In the *Market10* treatment, the 10-period version of the Market treatment, the procedures follow the same rules as in the Market treatment, except that subjects repeat the market interaction for 10 periods. Similarly, in the *Individual10* treatment, the 10-period version of the Individual treatment, subjects repeat the individual decision task for 10 periods. In both the *Market10* and the *Individual10* treatments, subjects are randomly matched with a new partner in each period; i.e., any two given subjects are never in the same group more than once. At the end of the experiment one of the 10 periods is randomly chosen and the result of the selected period is implemented.

### *Materials and Methods*

All sessions took place at the computer laboratory of the Department of Economics at the University of Zurich between May 2014 and June 2015. Subjects were mainly students from the University of Zurich and the Swiss Federal Institute of Technology (ETH) in Zurich. The study was conducted using the software z-Tree (Fischbacher, 2007). Before entering the lab, each subject randomly drew a place card that allocated subjects to computer terminals. If a treatment involved different roles, the terminal number determined the role of each subject. Subjects received written instructions, including comprehension questions that had to be answered correctly before a session could begin. Sessions with single-period treatments lasted about 1 hour and sessions with 10-period treatments lasted about 1.5 hours. Each subject received a show-up fee of CHF 15 and an additional payment depending on the decisions made in the experiment. Subjects did not participate more than once in this experiment – 97 subjects participated as active decision makers in the Individual treatment, 98 subjects participated in the Market treatment, 106 subjects participated in the *Market10* treatment, and 97 subjects participated in the *Individual10* treatment.<sup>10</sup>

## 2.3 RESULTS

### *Measuring morality*

We operationalize moral behavior by measuring a subject's reservation price (RP) for accepting harm imposed on a third party, i.e., thwarting the donation for the surgery of a leprosy patient in India.

<sup>10</sup> Table A.1 (see Appendix) provides an overview of all treatments, the respective number of sessions, and sample sizes.

First, consider the individual treatments, Individual and Individual<sub>10</sub>. We define the reservation price of subject  $i$  in period  $t$ , denoted by  $RP_{i,t}$ , as the minimum payoff for which the subject prefers the own financial gain over the donation. If a subject prefers the donation in all lines of the price list, then  $RP_{i,t} > 20$ . In contrast to the individual treatments, reservation prices cannot be directly observed in the market treatments; instead, they have to be derived from the actions taken in the market. We approximate the reservation price of a subject in the market treatments by measuring the lowest payoff for which the subject signals a willingness to reach an agreement.<sup>11</sup> Let  $a_{i,t}$  denote the amount that subject  $i$  accepts in period  $t$  (if subject  $i$  does not accept an offer, then  $a_{i,t} > 20$ ), and let  $s_{i,t}$  denote the lowest share that subject  $i$  demands in period  $t$  (if subject  $i$  does not post any demand in period  $t$ , then  $s_{i,t} > 20$ ). In the market treatments, our measure of the reservation price of subject  $i$  in period  $t$  is given by  $RP_{i,t} = \min(s_{i,t}, a_{i,t})$ . If a subject neither posts a demand nor accepts an offer, then  $RP_{i,t} > 20$ .

Unlike the Individual treatment and the Market treatments, which consist of only a single period, the Market<sub>10</sub> and Individual<sub>10</sub> treatments provides 10 reservation prices for each subject – one in each period. Therefore, to make single-period and 10-period treatments comparable, the 10 measures in the Market<sub>10</sub> and Individual<sub>10</sub> treatments need to be translated into a single reservation price  $RP_i$ . In order to relate our results to those in F&S we follow their analysis by focusing on the minimum of these reservation prices as the measure of moral behavior (i.e., in the Market<sub>10</sub> and the Individual<sub>10</sub> treatment  $RP_i = \min_t RP_{i,t}$ ).

F&S use the fraction of subjects with  $RP_i \leq 10$  as the key outcome variable that is compared between treatments. However, this measure might overestimate morality in the market treatments if subjects realize gains from trade – i.e., if an agreement leads to a payoff that is larger than the underlying reservation price of the subject. For example, a subject with a true reservation price of 8 might conclude a trade that secures the subject a payoff of 12. This subject would count as  $RP_i > 10$  in the Market treatment, but as  $RP_i \leq 10$  in the Individual treatment, where reservation prices are measured directly. One way to address potential measurement problems associated with gains from trade is to focus the analysis on the fraction of subjects with  $RP_i \leq 20$ . Since subjects with  $RP_i > 20$  enforce the moral outcome by neither posting nor accepting a demand within a market period, they cannot possibly realize gains from trade and therefore cannot be falsely categorized as subjects with  $RP_i \leq 20$ . To avoid potential measurement problems associated with gains from trade we

<sup>11</sup> F&S focus only on the amount of money received from a concluded trade. However, this measure might overestimate moral behavior in markets, since it ignores the information contained in demands that were posted, but not accepted by the other market participant.

compare treatments based on the fraction of subjects with  $RP_i \leq 20$ . When we relate our results directly to those of F&S, we report the fraction of subjects with  $RP_i \leq 10$  as the main outcome variable and use the fraction of subjects with  $RP_i \leq 20$  as a robustness check.

#### *Reproducing the erosion of morality in the market treatment*

We first focus on reservation prices in the Individual and the Market10 treatment, following the treatment comparison in F&S. If we find similar treatment effects to those reported by F&S, we can conclude that the erosion of moral values in the market treatment i) is not confined to the mouse paradigm used by F&S, but extends to our leprosy paradigm as well and ii) cannot be explained by treatments differences in F&S that we control for, including the number of players, the set of possible distributions, the total surplus of subjects, and the timespan between introducing the externality to subjects and actual decision making.

**RESULT 1:** *Controlling for the number of players, the set of possible distributions, the total surplus, and the timespan between introducing the externality to subjects and actual decision making, we reproduce the results of F&S using a different moral decision domain. Subjects' reservation prices for accepting harm imposed on a third party are significantly lower in the Market10 treatment than in the Individual treatment.*

As shown in [Figure 2.1a](#), the fraction of subjects with  $RP_i \leq 10$  increases significantly from 41.2% in the Individual treatment to 75.5% in the Market10 treatment (Probit regression,  $p < 0.001$ )<sup>12</sup>, an effect size that is comparable to the one in F&S (see [Figure 2.1b](#)). However, the minimum reservation price across all 10 periods might represent a distorted measure of moral behavior in the market, because any variation in behavior over time, for instance due a stochastic element in the decision-making process, would affect the results only in one direction – more immoral behavior in the market. Yet, we find, similar to F&S, that moral values are undermined right from the start of the Market10 treatment. The fraction of subjects with  $RP_{i,1} \leq 10$  (focusing on the first period only) is significantly larger in the Market10

<sup>12</sup> We compare the fraction of subjects with  $RP_i \leq \overline{RP}$  between treatments based on a Probit regression of the form  $\Pr(y_i = 1|x) = \Phi(\beta_0 + \beta_1 x_i)$ , where  $\Phi$  is the cumulative density function of the standard normal distribution,  $x$  is a treatment dummy,

$$\text{and } y_i = \begin{cases} 1 & \text{if } RP_i \leq \overline{RP} \\ 0 & \text{if } RP_i > \overline{RP} \end{cases}.$$

Depending on the outcome variable used,  $\overline{RP}$  is either 10 or 20. Standard errors are clustered at the individual level in individual treatments, at the group level in single-period market treatments, and at the session level in repeated market treatments. If reservation prices are based on the first period of a repeated market treatment, standard errors are clustered at the first-period group level.

treatment (56.6%) than in the Individual treatment (41.2%; Probit regression,  $p=0.026$ ).

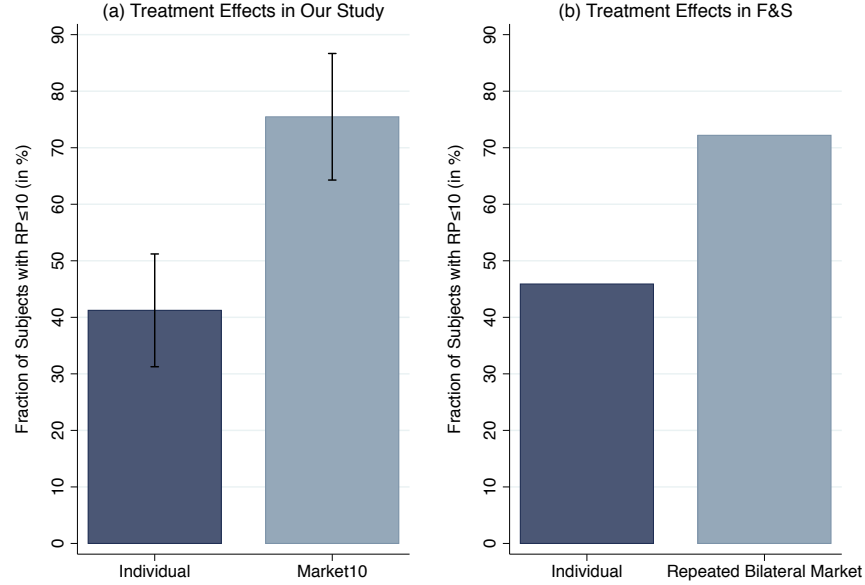


Figure 2.1: Moral values in single-period individual and repeated market treatments

*Note:* Figure 2.1a shows the fraction of subjects with a reservation price smaller or equal to CHF 10 for accepting harm imposed on a third party in our Individual and our Market10 treatment. Error bars represent 95% confidence intervals with standard errors adjusted for clustering at the session level in the Market10 treatment. Figure 2.1b depicts the results obtained by F&S.

#### *Controlling for the number of periods*

The previous analysis is based on a treatment comparison that involves an unequal number of decision periods and, therefore, allows us to measure only the combined effect of the market institution and the number of decision periods. To disentangle the institutional effect from a potential period effect, we now compare behavior between the individual decision context and the market institution while holding the underlying decision periods constant across treatments.

**RESULT 2:** *The erosion of moral values in the Market10 treatment as compared to the Individual treatment can be explained by the different number of underlying decision periods and is not driven by the market institution itself. Moral behavior does not differ between individual and market treatments if the number of decision periods is held constant.*

As Figure 2.2 illustrates, the fraction of subjects with  $RP_i \leq 10$  is virtually identical between the Individual and the Market treatment



(Probit regression,  $p=0.93$ ). If both treatments consist of a single period only, moral behavior remains unaffected by the market. However, the deterioration of moral values in the Market10 treatment might be caused by an expected repeated *market* experience and not by the expected repetition per se; therefore, we conducted the Individual10 treatment, which – like the Market10 treatment – repeats the task for 10 periods.

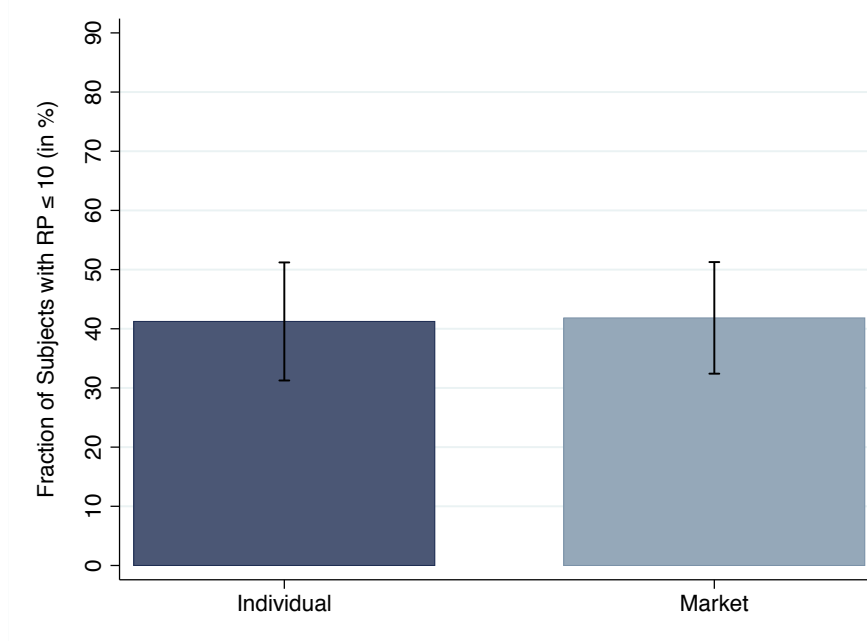


Figure 2.2: Moral values in single-period individual and single-period market treatment

*Note:* This figure compares the fraction of subjects with a reservation price smaller or equal to CHF 10 for accepting harm imposed on a third party between the Individual and the Market treatment, both consisting of a single period. Error bars represent 95% confidence intervals with standard errors adjusted for clustering at the group level in the Market treatment.

In [Figure 2.3](#) subjects' behavior is compared between the Individual10 and the Market10 treatment using different approaches to determine the relevant reservation price. In particular, we consider the reservation price in the first period ( $RP_{i,1}$ ), the minimum reservation price across all 10 periods ( $\min_t RP_{i,t}$ ), and the median reservation price across all 10 periods ( $\text{median}_t RP_{i,t}$ ). Moral behavior does not differ between the two treatments based on any of the three measures:  $RP_{i,1}$  (Probit regression,  $p=0.663$ ),  $\min_t RP_{i,t}$  (Probit regression:  $p=0.13$ ), and  $\text{median}_t RP_{i,t}$  (Probit regression,  $p=0.987$ ). The increase in the number of periods leads to an erosion of moral behavior in both the market and the individual decision contexts. The fraction of subjects with  $\min_t RP_{i,t} \leq 10$  is significantly larger in the Individual10 treatment (67.0%) than in the Individual treatment (41.2%; Probit regression,  $p<0.001$ ). The negative impact of the increased number of

periods on moral behavior seems to materialize already in the first period of the Individual<sub>10</sub> treatment, an effect that is significant at the 10%-level (Probit regression,  $p=0.085$ ). Moreover, moral behavior remains relatively stable over the 10 periods in both the Individual<sub>10</sub> and the Market<sub>10</sub> treatment (see [Section 2.4](#), where we discuss the results of the social information treatment).

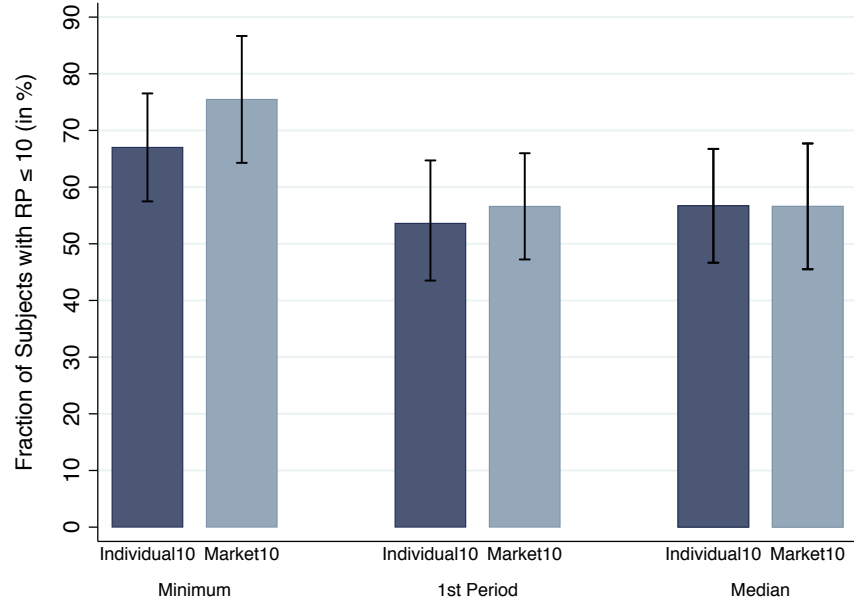


Figure 2.3: Moral values in repeated individual and repeated market treatment

*Note:* This figure compares the fraction of subjects with a reservation price smaller or equal to CHF 10 for accepting harm imposed on a third party between the Individual<sub>10</sub> and the Market<sub>10</sub> treatment, based on different specifications of the reservation price of a given subject. Error bars represent 95% confidence intervals with standard errors adjusted for clustering at the individual level in the Individual<sub>10</sub> treatment, at the session level in the Market<sub>10</sub> treatment for the minimum and median RP measures, and at the level of first-period groups in the Market<sub>10</sub> treatment for the first-period RP measure.

Next we compare treatments based on the fraction of subjects with  $RP_i \leq 20$  to address potential measurement problems that might arise from realized gains from trade, as discussed above. None of the reported results based on the fraction of subjects with  $RP_i \leq 10$  changes qualitatively if we use the fraction of subjects with  $RP_i \leq 20$  instead. [Table 2.2](#) shows the key treatment comparisons using the fraction of subjects with  $RP_i \leq 20$ . The second column denotes the difference in the fraction of subjects with  $RP_i \leq 20$  between the individual and the comparable market treatment. The p-values in the third column refer to the Probit regression that compares the fraction of subjects with  $RP_i \leq 20$  between the market and the respective individual treatment. The fraction of subjects with  $RP_i \leq 20$  differs neither between the Individual and the Market treatment nor between the Individual<sub>10</sub> and

TREATMENT COMPARISON	$\Delta$ FRACTION $RP_i \leq 20$	P-VALUE
Ind – Market	+6.76	0.353
Ind <sub>10</sub> – Market <sub>10</sub> (1st period)	–6.14	0.292
Ind <sub>10</sub> – Market <sub>10</sub> (minimum)	–8.53	0.121
Ind <sub>10</sub> – Market <sub>10</sub> (median)	–1.33	0.839

Table 2.2: Key treatment comparisons based on  $RP_i \leq 20$ 

*Note:* This table compares the individual and market treatments based on the fraction of subjects with a reservation price smaller or equal to CHF 20 for accepting harm imposed on a third party. The second column denotes the difference in this fraction (in percentage points) between the individual and the comparable market treatment. The p-values in the third column refer to the respective Probit regression, comparing the fraction of subjects with a reservation price smaller or equal to CHF 20 for accepting harm imposed on a third party between the market and the respective individual treatment.

the Market<sub>10</sub> treatment. Hence, reservation prices for accepting harm imposed on a third party do not erode in the market treatments, even if potential gains from trade are taken account of. The analyses in the remainder of the paper will be focused on the fraction of subjects with  $RP_i \leq 20$  to avoid overestimating moral behavior in the market.

## 2.4 MORAL BEHAVIOR IN MARKETS UNDER COMPETITION AND SOCIAL INFORMATION

### *Moral behavior in markets under competition*

The bilateral bargaining setting considered so far in the market treatments rules out competition among market participants and, hence, disregards the potential impact of an inherent features of many markets on moral behavior.

As discussed in [Section 2.1](#), introducing competition among responders in ultimatum games substantially increases the propensity of responders to accept unfair offers. For example, Fischbacher, Fong, and Fehr (2009) show that an offer of 10% of the total surplus gets rejected by around 80% of responders in the ultimatum game without responder competition, whereas the same offer gets rejected by only around 25% of responders in the ultimatum game with five competing responders. If the reaction to competition is similar in markets and ultimatum games, competition would be expected to have substantially detrimental effects on morality in markets.

Following the setup of our Market treatment we introduce competition on one side of the market to test whether competition undermines moral values. In the *Market1vs2* treatment one participant, henceforth the “monopolist”, bargains simultaneously with two other

participants, henceforth the “competitors”, over the split of CHF 20. In each group at most one agreement can be reached. The monopolist can choose among the demands of the two competitors and the competitors can accept a demand of the monopolist. If one of the three participants accepts a demand within three minutes, both participants receive their respective share, the surgery is not funded, and the remaining competitor does not receive any additional payment. Note that the surgery is financed only if none of the three participants accepts a demand. Competitors cannot observe the posted demands of each other. Since competitors observe the demands of only a single other participant, the monopolist, the amount of social information transmitted to the competitors in the Market1vs2 treatment is comparable to the available social information in the Market treatment. By holding social information comparable to the Market treatment, we isolate the effects of competition on moral values and study the effects of social information in another treatment, which is reported in the next section. After an agreement has been reached, the competitor who is not part of the agreement can continue posting or accepting demands until the three minutes have elapsed, but those actions remain irrelevant for the outcome. Only after the three minutes have elapsed competitors learn whether the other competitor has already concluded the trade and, if a subject has accepted a demand during the market period, whether this decision will count or not. This procedure ensures that the time available for competitors to take an action in the Market1vs2 treatment is not truncated as compared to the Market and the Individual treatment. The Market1vs2 treatment, like the Market treatment, consists of a single period.

In the *Market1vs4* treatment we further increase the potential of competition to affect moral behavior as compared to the Market1vs2 treatment. The Market1vs4 is identical to the Market1vs2 treatment, except that the monopolist bargains simultaneously with four competitors. Now the surgery is only financed if none of the five participants accepts a demand. Therefore, competitors who refrain from trade in the Market1vs4 face a higher likelihood of being “replaced” by another competitor than competitors in the Market1vs2 treatment.

**RESULT 3:** *Moral values remain robust against competition in markets. Reservation prices for accepting harm imposed on a third party in the Market1vs4 and Market1vs2 treatments are similar to those in the Individual and the Market treatment.*

Only subjects in the role of competitors are included in the analysis of the competition treatments. There are three reasons for excluding monopolists from the analysis. First, we are interested in the effects of competition on morality, and only subjects in the role of competitors face competition. Second, on average monopolist will receive a greater share of the surplus than competitors, because monopolists

have greater bargaining power. Hence, reservation prices of monopolists will appear higher than those of competitors. By focusing on competitors only, we increase the chances to find a negative effect of markets on reservation prices. Third, monopolists, who bargain with more than one other market participant, necessarily receive more social information than subjects in the Market treatment.

Figure 2.4 depicts the fraction of subjects with  $RP_i \leq 20$  in the Individual, Market1vs2 and Market1vs4 treatments. Moral values do not differ between the competition treatments and the Individual treatment (Market1vs2: Probit regression,  $p=0.795$ ; Market1vs4: Probit regression,  $p=0.726$ ). Moreover, we do not find a difference in morality between the competition treatments and the Market treatment, where the fraction of subjects with  $RP_i \leq 20$  is 56.1% (Market1vs2: Probit regression,  $p=0.441$ ; Market1vs4: Probit regression,  $p=0.456$ ). Compared to a situation where market participants can unilaterally enforce the prosocial outcome, subjects are not more likely to engage in trade when they face the prospect of being “replaced” by a competing trader.

Our results differ from those in ultimatum games with responder competition, because the reaction of a responder to an unfair offer is not subject to prevailing social norms, and no shared understanding exists that a responder should punish the proposer by rejecting an unfair offer. While accepting an unfair offer in the ultimatum game is not considered inappropriate, imposing harm on a leprosy patient is clearly deemed an immoral act (Bartling and Özdemir, 2016). Due to the moral costs associated with taking an immoral action, moral behavior can remain robust against competitive forces in markets.

#### *Moral behavior in markets under social information*

The market treatments that we considered so far offer only limited scope for social learning. Although monopolists in the Market1vs2 and the Market1vs4 treatment observe the posted demands of two or four other market participants respectively, the received social information remains relatively scarce. Moreover, subjects do not have sufficient time to adjust their behavior after a learning experience, because the interaction is one-shot. The Market10 treatment, on the other hand, is repeated for 10 periods, but subjects observe the behavior of only a single participant in each period.

To study how social information in markets affects moral values we increase the amount of information that subjects receive about actions taken by other market participants. The *Market10SI* treatment is identical to the Market1vs4 treatment, except that all group members observe the posted demands of each other and the interaction is repeated for 10 periods. Roles (monopolist or competitor) remain fixed throughout the 10 periods, but subjects are randomly matched with

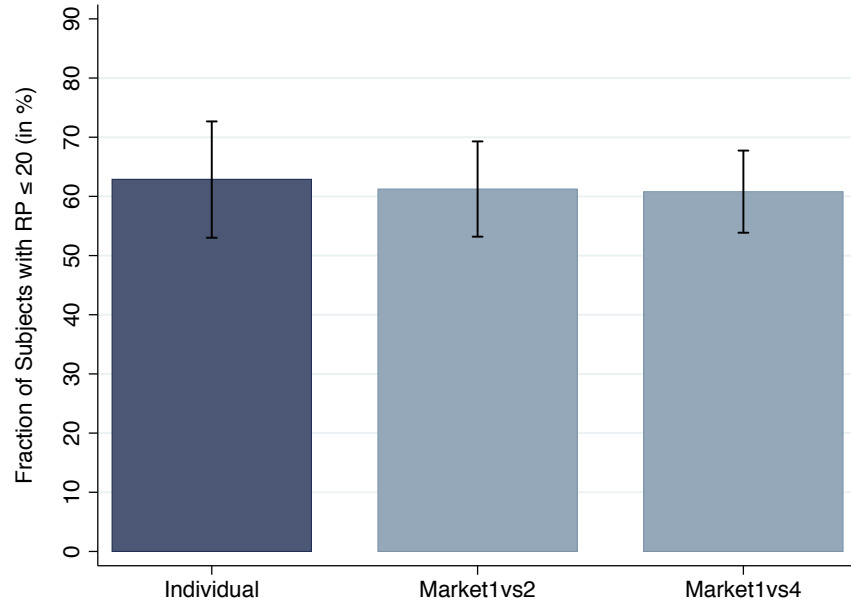


Figure 2.4: Moral values in the competition treatments

*Note:* This figure shows the fraction of subjects with a reservation price smaller or equal to CHF 20 for accepting harm imposed on a third party in the competition treatments and in the Individual treatment. Error bars represent 95% confidence intervals with standard errors adjusted for clustering at the group level in the Market1vs2 and the Market1vs4 treatment.

four other participants in each period following a stranger matching design. After each market period, subjects are informed about whether an agreement has been reached in their group. At the end of the experiment, one of the 10 periods is randomly chosen, and the result of the selected period is implemented for all participants in the session.

**RESULT 4:** *Increased opportunities for social learning in the market have significantly positive effects on moral behavior over time. In the first period of the interaction, the fraction of subjects with  $RP_i \leq 20$  is similar among the Individual<sub>10</sub>, Market<sub>10</sub>, and Market<sub>10</sub>SI treatments. However, while moral values remain relatively constant in the Individual<sub>10</sub> and Market<sub>10</sub> conditions, they improve substantially over time in the Market<sub>10</sub>SI treatment, where competition prevails and social learning opportunities are highest.*

In Figure 2.5, the fraction of subjects with  $RP_i \leq 20$  is plotted over the 10 periods of the Individual<sub>10</sub>, Market<sub>10</sub>, and Market<sub>10</sub>SI treatments. In the first period, moral values in the Market<sub>10</sub>SI treatment differ neither from those in the Market<sub>10</sub> treatment (Probit regression,  $p=0.846$ ) nor from those in the Individual<sub>10</sub> treatment (Probit regression,  $p=0.541$ ). The fraction of subjects with  $RP_i \leq 20$  remains relatively constant in the Market<sub>10</sub> and the Individual<sub>10</sub> treatment,

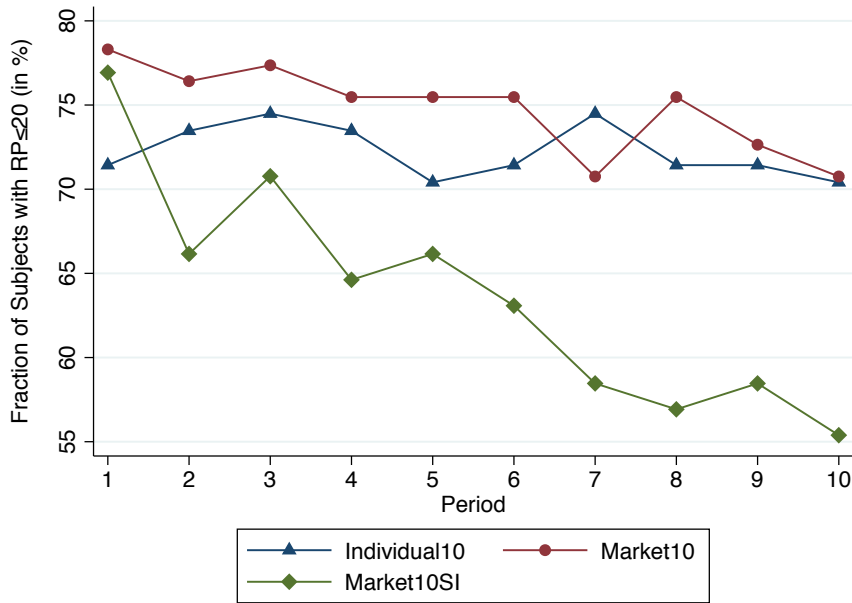


Figure 2.5: The evolution of moral values over time

*Note:* This figure shows the fraction of subjects with a reservation price smaller or equal to CHF 20 for accepting harm imposed on a third party across the 10 periods of the repeated treatments.

converging to around 70% in both treatments. However, moral values improve substantially in the Market10SI treatment, where the fraction of subjects with  $RP_i \leq 20$  drops from 76.9% in the first period to 55.4% in the last period (Probit regression,  $p < 0.001$ ). In the last period, after having been exposed to competition and social information for nine rounds, subjects in the Market10SI treatment behave significantly more morally than subjects in both the Individual10 treatment (Probit regression,  $p = 0.026$ ) and the Market10 treatment (Probit regression,  $p = 0.042$ ).

## 2.5 CONCLUSION

The recent experimental findings of F&S have been interpreted as causal evidence for the destructive effects of markets on moral values. In this paper we show that this interpretation needs to be reconsidered, because the results of F&S can be traced back to a procedural confound that is not related to markets. Specifically, F&S compare a repeated market treatment with a single-period individual treatment, but we show that subjects are significantly more likely to behave selfishly in repeated experimental settings with random pay than in one-shot decision contexts, independent of the underlying institution. If the number of periods is controlled for, markets do not affect morality. Moreover, moral values remain robust against competition in markets,

and if the actions of other market participants are observable, moral values improve over time.

Our results cast doubt on the view that markets erode moral values. Moral behavior not only appears robust against various market features but even improves in markets that provide social information. However, the experimental methods employed in this paper can only measure the immediate effects of a simulated market on moral behavior; evidence on the long-term effects of markets on preferences is still lacking. Moreover, it remains an open question how cultural factors interact with the influence of markets on moral behavior (see Bartling, Weber, and Yao, 2015). For example, the maturity of market institutions in a society might affect prevailing social norms about proper behavior in market environments. Finally, our results also have methodological implications, suggesting that in the context of moral decision-making repeated measurements with random pay might lead to different results than one-shot elicitations.



## THE LIMITS TO MORAL EROSION IN MARKETS: SOCIAL NORMS AND THE REPLACEMENT EXCUSE

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### ABSTRACT

This paper studies the conditions under which the replacement excuse, the argument that “if I don’t do it, someone else will,” leads to the erosion of moral behavior in competitive markets. We show in a series of laboratory and online experiments that the force of the replacement excuse depends on the social norm associated with the underlying action. We find that subjects do not follow the replacement excuse if the prevailing social norm classifies the underlying action as inconsistent with moral behavior. In these cases many subjects do not take the action, even if its omission will probably be replaced by someone else, so that the immoral outcome will be induced nevertheless. However, many subjects who would not take the action if its omission could not be replaced take the action under the shadow of replacement if no mutual understanding exists whether the underlying action is consistent or inconsistent with moral behavior. Our results enhance our understanding of the effects of competitive institutions on moral behavior by providing insights into the power and the limits of the replacement excuse.

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If we want to stop the defence industry operating in this country we can do so, and the result incidentally will be that someone else supplies the arms that we supply.

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Tony Blair (2002)

### 3.1 INTRODUCTION

One of the founders of the Chicago school, Frank H. Knight (1923), wrote in an early paper that “it must be conceded that the lines along which a competitive economic order tends to form character are often far from being ethically ideal” (p. 591). The possibility that competitive markets erode moral standards is debated ever since (e.g. Bartling, Weber, and Yao, 2015; Bowles, 1998; Falk and Szech, 2013; Sandel, 2012; Shleifer, 2004), but evidence on the causal effect of being in a competitive environment on moral behavior is still scarce. In this paper, we study a key feature of competitive markets: the possible replacement of the omission of a profitable but unethical business transaction by a less scrupulous competitor. The replacement excuse, that is, the argument that “if I don’t do it, someone else will,” has intuitive appeal and it might lead market actors to leave behind their moral standards. Tony Blair for instance, then UK’s prime minister, justified controversial arms exports in the above quotation by saying (probably correctly) that someone else would have stepped in, had not the UK supplied the arms.

From the point of view of consequentialist or utilitarian ethics, the replacement argument provides justification for *any* action because it is only outcomes that matter for ethical assessment. Given that some outcome is going to result anyway (say, an authoritarian regime receives arms), taking the action leading to it (delivering the arms) does not change or worsen the outcome; hence, it is not ethically wrong. Deontological ethics, in contrast, judges an action with respect to its adherence to a rule or principle. The fact that an undesirable outcome will come about anyway (the regime in possession of the arms) does not render the action that actually implements the outcome ethically right: “If we accept this as a justification, it is hard to see what acts, however otherwise wicked, could not be defended in the same way” (Glover and Scott-Taggart, 1975). In this paper, we take an empirical approach – looking at actual behavior of economic actors instead of making normative statements – and study experimentally when the replacement excuse undermines moral behavior and when it does not.

Studying if inherent features of competitive markets, such as the possible replacement of one firm’s ethical course of action by a less

conscientious competitor, lead all market participants to abandon their moral behaviors is of increasing importance because the “reach of markets, and market-oriented thinking, into aspects of life traditionally governed by nonmarket norms is one of the most significant developments of our time” (Sandel, 2012, p. 7). If competitive markets do not only efficiently (at best) allocate goods and services but also, as a side effect, crowd out morals, then the traditional economic analysis of the welfare properties of market mechanisms – focusing on allocative efficiency under the assumption of given preferences – will be incomplete and prone to resulting in misguided policy advice.

Our leading example on arms trade might suggest that competition generally undermines ethical behavior because a single ruthless competitor (or latent market entry of such a competitor) suffices to trigger the replacement excuse. But behavior consistent with ethical conduct is often observed in competitive markets. Financial services firms that are dedicated to ethical investment strategies – thereby foregoing potentially more profitable investments in, say, arms manufacturers, tobacco, or fracking – can serve as example (e.g. Sparkes and Cowton, 2004). However, with field data it is difficult to separate true corporate social concern from reputational incentives or from being driven by consumer demand. Observed ethical business practices can thus be compatible with the goal of profit-maximization (e.g. Aupperle, Carroll, and Hatfield, 1985; Porter and Kramer, 2006; Sauer, 1997). Likewise, consumers investing in ethical funds might hold the belief that these investments are more sustainable and perform better in the long-run. This renders it difficult to identify moral behaviors with naturally occurring field data and to study when the replacement excuse weakens or eliminates moral behaviors and when it does not. An experimental approach allows studying this question while controlling for confounding factors.

In this paper, we seek to identify one fundamental mechanism that determines when people use the replacement excuse, i.e. when they take actions (such as selling arms to an authoritarian regime) that they would not take absent possible replacement by a competitor and when they refrain from these actions, even if it is likely that a competitor will step in (and sell the arms instead). In particular, we test the hypothesis that not only *outcomes* matter for a player’s utility but also her actions. If only outcomes mattered, an economic actor would always prefer to make a profitable but unethical business transaction himself rather than let someone else make that transaction. Clearly, own profits are higher, while other dimensions of the outcome space (the regime in possession of the arms) are unchanged. But if people also derive (dis)utility from their actions (being the person who sells the arms), then an economic actor will not necessarily make the transaction, even if refraining from it will make no difference – except that someone else is enjoying the monetary gains from trans-

acting. More specifically, we test the hypothesis that people incur a utility loss from taking an action that does not conform to the prevailing social norms of acceptable and moral behavior (e.g. Krupka and Weber, 2013; Lindbeck, 1997; López-Pérez, 2008). The source of this utility cost can be driven by self-image or identity concerns (e.g. Akerlof and Kranton, 2000, 2005; Bénabou and Tirole, 2004, 2006; Bodner and Prelec, 2003; Köszegi, 2006; Mazar, Amir, and Ariely, 2008), social image concerns (e.g. Akerlof, 1980; Andreoni and Bernheim, 2009; Ariely, Bracha, and Meier, 2009; Bernheim, 1994), or the “cold prickle,” rather than the “warm glow,” of taking an action that does not conform the prevailing social norms (Andreoni, 1989, 1990, 1995). Hence, even if an unethical outcome is likely to come about anyway, a “principled” economic actor might not want to be the person who actually implements the unethical outcome – provided the applicable social norm is strong. Principled economic actors thus do not necessarily fall prey to the replacement “logic”. The possibility that people experience a disutility from breaking social norms of proper and moral behavior thus constitutes a potentially powerful mechanism that limits the extent to which the replacement excuse undermines moral behavior in competitive environments.

We find that subjects do not follow the replacement excuse if the prevailing social norm classifies the underlying action as inconsistent with moral behavior. In these cases many subjects do not take the action, even if its omission will probably be replaced by someone else, so that the immoral outcome will be induced nevertheless. However, many subjects who would not take the action if its omission could not be replaced take the action under the shadow of replacement if no mutual understanding exists whether the underlying action is consistent or inconsistent with moral behavior. Our results enhance our understanding of the effects of competitive institutions on moral behavior by providing insights into the power and the limits of the replacement excuse.

The remainder of the paper is organized as follows. [Section 3.2](#) describes the experimental design of our donation games and presents the main result on the absence of the replacement effect when a clear social norm regarding appropriate moral behavior exists. [Section 3.3](#) reports data from a series of simple take games and provides replications of our main result. [Section 3.4](#) analyzes data from ultimatum games with responder competition and shows that the replacement excuse is effective in this class of games, where no social norm exists with respect to responder behavior. [Section 3.5](#) concludes.

### 3.2 DONATION GAME

#### *Experimental Design*

We study the effect of the availability of the replacement excuse on moral behavior in a simple donation game. Subjects make a binary choice between either receiving a payment of 20 CHF (about 21 USD) or having the experimenter transfer 60 CHF to FAIRMED, a Swiss charity, to finance the surgery of a leprosy patient in India. The experimental instructions provided basic facts about the donation. Subjects were informed that leprosy is an infectious disease that causes damage of nerve cells and blockage of arteries and veins, which can lead to bodily disfigurement. Although the disease can be cured with medical treatment, many leprosy victims suffer from a high degree of stigmatization due to disfigurement. Often small surgical interventions can significantly reduce the scope of disfigurement. Almost 60 percent of the global leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

We conducted two experimental conditions of the donation game. The *baseline condition* is an individual decision task. A subject (player 1) makes the individual decision to either take 20 CHF or having the experimenter finance the surgery. The *replacement condition* is a three-player game. Subjects are randomly placed into groups of three and assigned the role of either player 1, 2, or 3. At most one player can take the 20 CHF and at most one surgery is financed per group. Players decide sequentially whether to take the 20 CHF or not. If a player decides to take the 20 CHF, the surgery is not financed and the game ends. The surgery is thus financed only if first player 1, then player 2, and finally player 3 forgo to take the 20 CHF.<sup>1</sup> Figure 3.1 shows the extensive form of the two conditions.

We also checked whether subjects perceived the decision between money and surgery as a *moral decision* – after all, we are interested in studying the effect of the replacement excuse on *moral* behavior. To measure if the donation game has a moral dimension, we elicited the *social norm* that applies to the decision to take the money, using a coordination game as measurement tool (e.g. Houser and Xiao, 2011; Krupka and Weber, 2013). We implemented a between-subjects design and asked subjects, either for the baseline condition or for the replacement condition, whether player 1's choice to take the 20 CHF would be rated by most people as “socially appropriate” and “consistent with moral or proper social behavior,” or as “socially inappropriate” and “inconsistent with moral or proper social behavior,” or

<sup>1</sup> We used the strategy method for players 2 and 3 and asked them to indicate whether they would take the money if they could make a choice, that is, if the preceding player(s) has not taken the money already.

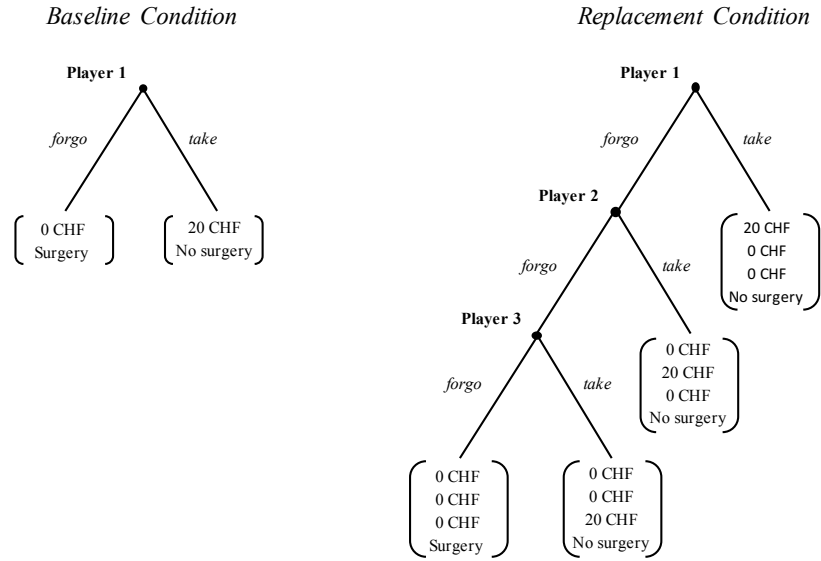


Figure 3.1: Donation game

as “neutral”.<sup>2</sup> We asked subjects to rate the appropriateness of the choice to take the money on a five-point scale ranging from “very socially inappropriate” and “somewhat socially inappropriate,” over “neutral”, to “somewhat socially inappropriate” and “very socially inappropriate”.<sup>3</sup> Importantly, we did not ask subjects to provide the rating they believe to be “right” but the rating they believe will be the most frequently chosen one by the other subjects in the session. Subjects received the instructions and control questions for the respective condition of the donation game. But instead of making the choice between money and surgery, we asked subjects to provide their guesses about the most frequently given response. Subjects received a bonus of 10 CHF if their guesses matched the modal response.

#### *Procedural Details*

All sessions took place at the decision laboratory of the Department of Economics at the University of Zurich. We implemented the study with z-Tree and h-Root (Bock, Baetge, and Nicklisch, 2014; Fischbacher, 2007). In total 432 subjects participated in the study. Subjects were mainly students from the University of Zurich and the ETH Zurich. We conducted eight sessions of the donation game, with 67 subjects in the baseline condition and 177 subjects, i.e., 59 in each role, in the replacement condition. Sessions lasted about 45 minutes and subjects earned on average CHF 19.75, including a show-up fee of 15

<sup>2</sup> Since our main interest is the choices of players 1, we only measure the norm that applies to player 1’s decision.

<sup>3</sup> The design follows closely the study by Krupka and Weber (2013), except that we added the neutral response option.

CHF. We elicited beliefs and norms at the end of other unrelated experimental sessions. No subject participated in our study more than once. We have 62 observations for the measurement of the social norm for each of the two conditions and elicited beliefs in the replacement condition from 64 subjects. These measurements took about 15 minutes and subjects earned on average 4.10 CHF. The experimental instructions for all games and measurements are in the appendix.

### *Hypothesis*

The key feature of the experimental design is that player 1's decision to forgo the 20 CHF cannot be replaced in the baseline condition but it can be replaced by either player 2 or, if not by player 2, then by player 3 in the replacement condition. The design thus allows studying the effect of the replacement excuse by comparing the fraction of players 1 who take the money ("take-rate") in the baseline condition to the fraction of players 1 who take the money in the replacement condition. This gives rise to our main hypothesis:

**HYPOTHESIS 1 (REPLACEMENT EXCUSE ERODES MORALITY IN THE DONATION GAME):** *The fraction of players 1 who take the money is higher in the replacement condition than in the baseline condition.*

### *Results*

Panel a of [Figure 3.2](#) shows that the take-rates of players 1 are almost identical in the baseline condition and in the replacement condition, 23.9 percent (16 of 67) and 25.4 percent (15 of 59), respectively ( $p=0.502$ , Fischer exact test, one-sided). We observe these data despite the fact the replacement probability increases from 0 (by design) in the baseline condition to 0.51 in the replacement condition. The take-rates of players 2 and 3 in the replacement condition are of the same size, 30.5 percent (18 of 59) and 28.8 percent (17 of 59), respectively. A Pearson's chi squared test confirms that we cannot reject that the take-rate is identical across both conditions and all player types ( $p=0.832$ ). Note that players 2 could make use of the replacement excuse as well, as their choice to forgo the 20 CHF can be replaced by player 3. In contrast, the choice of players 3 to forgo taking the money cannot be replaced – as is the case for players 1 in the baseline condition.

To exclude the possibility that our experimental treatment is ineffective, we provide a manipulation check and measure whether subjects in the replacement condition indeed believe that the replacement probability for player 1 is positive. We find that at least 75 percent of subjects state a strictly positive belief.<sup>4</sup> Hence, the large majority

<sup>4</sup> 25 percent of subjects stated belief of 5 percent, which could reflect a true belief of 0 percent because subjects receive a bonus of 10 CHF if their stated belief is within 5

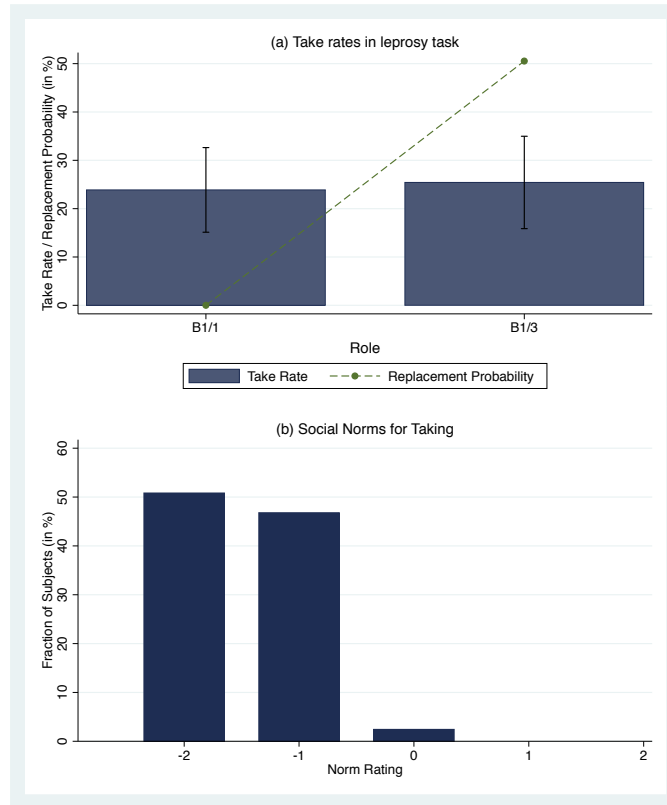


Figure 3.2: Take rates and social norms in the donation game

*Note:* a) The bars show the fraction of first movers in the donation game who took the money in the baseline and the replacement condition. B1/1 denotes player 1 in the baseline condition, and B1/3 denotes player 1 in the replacement condition. Error bars depict 95% confidence intervals. The dotted line shows the empirical probability that at least one of the subsequent players takes the money if the first mover does not take it. b) This figure shows the distribution of norm ratings for the decision of a first mover to take the money. The ratings are pooled across the baseline and the replacement condition. The ratings are coded as follows: -2 “very socially inappropriate”, -1 “somewhat socially inappropriate”, 0 “neutral: neither socially inappropriate nor socially appropriate”, 1 “somewhat socially appropriate”, 2 “very socially appropriate”.

of subjects in our belief elicitation task expect that player 1’s decision to forgo taking the money will be replaced with strictly positive probability. Subjects however tend to underestimate the replacement probability; the average belief is 0.23, while the true value is 0.51. We summarize our findings in our first result.

**RESULT 1 (MORAL STEADFASTNESS IN THE DONATION GAME):**  
*Subjects do not use the replacement excuse in the donation game. The possibility that a player’s decision to forgo taking the money can be replaced by subsequent players in the replacement condition does not result in take-*

percentage points of the true value. The observation that none of the subjects stated a belief of 0 indicates that subjects understood the incentive structure.



*rates that are different from the baseline condition, where replacement is not possible.*

We finally verify that the choice between taking 20 CHF and enabling a leprosy surgery in India is indeed perceived as a *moral decision*. Panel b of Figure 3.2 displays the results of the elicitation of the social norm that applies to taking the money, pooled across both conditions. The rating ranges from “very socially inappropriate” over “neutral” to “very social appropriate.” Averaged over both conditions, 97.6 percent of the subjects rate the decision to take the money as either “somewhat socially inappropriate” or “very socially inappropriate.” The latter is the modal choice in both conditions. No subject chose “somewhat” or “very socially appropriate” in either condition. The distribution of the ratings is virtually identical in both conditions ( $p=0.7951$ , Mann Whitney U test). We summarize the measurement of the social norm in the following.

**RESULT 2 (DONATION GAME HAS MORAL DIMENSION):** *A strong social norm exists that taking 20 CHF, instead of enabling a leprosy surgery in India, is inconsistent with moral and proper behavior. Almost all subjects rate the decision to take the money as either “somewhat socially inappropriate” or “very socially inappropriate” in both experimental conditions.*

In summary, our data show that subjects do not make use of the replacement excuse in our donation game, where a strong social norm exists that taking the 20 CHF is inconsistent with proper and moral behavior. The replacement excuse – that is, the argument that taking the money does not make a difference because a subsequent player is likely to take the money anyway – does not affect the subjects’ take-rate. These data show that competitive institutions and the associated replacement excuse do not necessarily lead to moral erosion.

### 3.3 TAKE GAMES WITH AND WITHOUT PUNISHMENT

Our Result 1, the nonexistence of the replacement effect in the donation game, challenges often-held intuitions. For example, Falk and Szech (2013) write: “This ‘replacement’ logic is a common feature of markets, and it is therefore not surprising that the rhetoric of traders often appeals to the phrase that ‘if I don’t buy or sell, someone else will’” (p. 710). In the following, we analyze behavior in a different game, with a different subject pool and with different stake sizes to provide robustness checks of our main finding as summarized in Result 1. We want to rule out the possibility that behavior in the donation game is an exception, driven, for instance, by an exceptionally strong social norm that taking the 20 CHF and thereby defeating the leprosy surgery is inconsistent with moral behavior.

### Experimental Design

We conducted a series of simple *take games* to revisit the question whether the replacement excuse affects moral behavior.

- *Take Game 1 (TG-1)* consists of two players: A and B1, who both start with an endowment of 0.5 USD. Player B1 makes the binary choice to either take away 0.4 USD from player A or to refrain from doing so. Player A cannot take an action. If B1 takes the money, player A's payoff is 0.1 USD and player B1's payoff is 0.9 USD. If B1 does not take the money both players receive their endowments of 0.5 USD.
- *Take Game 2 (TG-2)* is identical to TG-1 but consists of three players: A, B1, and B2, who all have endowments of 0.5 USD. First, B1 can take away 0.4 USD from A. If B1 does not take the 0.4 USD, then B2 can do so.
- *Take Game 3 (TG-3)* is different only in that it consists of four players: A, B1, B2, and B3. If neither B1 nor B2 takes the money, B3 can finally do so.

The important feature of the experimental manipulation of the take game is the variation of the number of players who can replace player B1's decision to forgo taking the money from player A, i.e., the variation of the replacement probability. Studying the take-rates of players B1 in conditions TG-1, TG-2, and TG-3 thus allow for a first robustness check of Result 1.

Moreover, we ran three additional conditions of the take games that feature a punishment option for player A. The *take games with punishment*, *TGwP-1*, *TGwP-2*, and *TGwP-3*, are identical to TG-1, TG-2, and TG-3, respectively, except that player A can spend up to 0.05 USD of her payoff to punish a player B, if that player B took away the money. For each 0.01 USD spent by player A, the payoff of the targeted player B decreases by 0.1 USD. Players B who do not take away money from player A cannot be punished.<sup>5</sup>

Adding a punishment option for player A serves two goals. First, the take games with punishment provide for a second robustness check of Result 1, in a design where taking the money from player A is less attractive in expectation. Second, the punishment data allow studying whether the replacement excuse provides "moral absolution" from the viewpoint of the victim. In *TGwP-3*, for example, do players A consider B1 less worthy of punishment for taking the

<sup>5</sup> We used the strategy method for players B2 and B3, in both the conditions with and without punishment, and asked them to indicate whether they would take the money if they could make a choice. We also used the strategy method for players A in the treatments with punishment. For instance, player A in *TGwP-3* made three punishment decisions, one for each player B who could take away the money.

money than players B<sub>3</sub> because the possibility of replacement excuses players B<sub>1</sub>?

As a manipulation check of the effectiveness of our experimental conditions in the take game, we measured the beliefs that B<sub>1</sub>'s decision to forgo taking the money will be replaced by B<sub>2</sub> in TG-2 or by B<sub>2</sub> or B<sub>3</sub> in TG-3, respectively. Furthermore, to verify that behavior in the take game has a moral dimension, we elicited the social norms that apply to B<sub>1</sub>'s decision to take the money from A in each of the three conditions TG-1, TG-2, and TG-3 separately. We used the same methods as in the donation game to measure these beliefs and social norms.<sup>6</sup>

### *Procedural Details*

Subjects were recruited on Amazon Mechanical Turk (MTurk), an online marketplace for tasks requiring human intelligence (see, e.g., Buhrmester, Kwang, and Gosling, 2011; Horton, Rand, and Zeckhauser, 2011). Participation was restricted to U.S. MTurkers with at least 500 completed assignments and minimum approval rating of 95 percent. We implemented the study with the software o-Tree (Chen, Schonger, and Wickens, 2016). MTurkers who clicked the link to our study were randomized into a condition and role of the take game or into one of the other measurement tasks. We controlled the subjects' understanding of the instructions by asking a set of test questions. Subjects were excluded if they could not provide correct answers within two attempts. All experimental instructions and test questions are in the appendix. Overall, 2,486 MTurkers participated, i.e., passed the test questions. Table 3.1 shows the number of observations for all conditions and measurement tasks separately. Subject could participate only once. Each subject received a fixed payment of 0.50 USD and earned a variable payoff on top. The variable payment in the take games depends on the choices of players B and, if applicable, the punishment behavior of players A. Subjects in the belief or norm measurement tasks earned 3 USD on top if their guesses of the norm matched the modal response or if their guesses of the replacement probability were not further away than 5 percentage points from the true value, respectively. On average, the MTurkers received a total payment of 1.07 USD and took about 6 minutes to complete the study, translating to an average hourly rate of about 10.70 USD.

<sup>6</sup> We did not measure beliefs and social norms in the conditions with punishment to economize on subjects. No apparent reason exists why a different social norm applies in the treatments with punishment or why the experimental manipulation of adding additional players B works differently when a punishment option for player A is present.

CONDITION	ROLE				ADDITIONAL MEASURES	
	A	B1	B2	B3	Norms	Beliefs
TG-1	126	126	-	-	126	-
TG-2	108	108	108	-	110	104
TG-3	108	108	108	108	100	104
TGwP-1	101	101	-	-	-	-
TGwP-2	112	112	112	-	-	-
TGwP-3	100	100	100	100	-	-

Table 3.1: Number of observations in take game

### *Hypotheses*

Equivalent to the donation games, the key feature of the take games is that player B1's decision not to take the 0.4 USD from player A cannot be replaced in TG-1 and TGwP-1, while it can be replaced by players B2, or B3, in the conditions with replacement. The design thus allows for two separate tests of the effect of the replacement excuse by comparing the take-rate of players B1 in TG-1 and TGwP-1 to the take-rates of players B1 in the conditions with replacement.<sup>7</sup> This gives rise to the following hypothesis:

**HYPOTHESIS 2 (REPLACEMENT EXCUSE ERODES MORALITY IN THE TAKE GAMES):** *The fraction of players B1 who take the money from player A, both with and without punishment, is higher in the conditions with replacement than in the conditions without replacement.*

The punishment pattern allows for a second, complementary test of whether individuals apply the replacement excuse. Players B might be the less worthy of punishment for taking money from player A the larger the probability that the alternative choice to not take the money will be replaced by a subsequent player B. This gives rise to the next hypothesis:

**HYPOTHESIS 3 (REPLACEMENT EXCUSE DEFLECTS PUNISHMENT):** *Players B1 are punished less by players A for taking the money than players B2, or B3, in the respective conditions with replacement.*

<sup>7</sup> In the appendix we show that the outcome-based, i.e., consequentialist, social preference model of Fehr and Schmidt (1999) predicts that the take-rate of players B1 is higher in conditions TG-2 and TG-3 than in condition TG-1.

### Results

We report the data from the take games without punishment first. Panel a of [Figure 3.3](#) shows that the take-rates of players B1 are very similar in all three conditions, 68.3 percent (86 of 126) in TG-1, 63.9 percent (69 of 108) in TG-2, and 60.2 percent (65 of 108) in TG-3. If anything, the take-rates are lower in TG-2 and TG-3 than in TG-1, but these differences are not significant ( $p=0.435$ , Pearson's chi-square test). These take-rates arise even though the replacement probability increases from 0 (by design) in TG-1 to 0.69 in TG-2 and 0.89 in TG-3. The take-rates of players B2 in TG-2 and of players B2 and B3 in TG-3 are equally similar, 68.5 percent (74 of 108), 67.6 percent (73 of 108), and 64.8 percent (70 of 108), respectively. We cannot reject that the decisions of players B in all conditions without punishment and in all roles originate from the same distribution ( $p=0.355$ , Pearson's chi square test).

The manipulation check reveals that 98.1 percent (102 of 104) and 96.0 percent (96 of 100) of the subjects believe that the replacement probability for player B1 is strictly positive in TG-2 and TG-3, respectively.<sup>8</sup> The average belief in TG-2, 0.61, is relatively close to the true value, 0.69. However, as in the replacement condition of the donation game, on average subjects underestimate the replacement probability in TG-3. The average belief in TG-3 is 0.65, while the true value is 0.89. Condition TG-3 and the replacement condition of the donation game have in common that two subjects can replace the first-mover's decision and it appears more challenging, both for students in the subject pool in Zurich and for MTurkers in the U.S., to estimate the replacement probability in these cases. Nevertheless, our manipulation checks clearly show that the absence of the replacement effect is not driven by unreasonable beliefs about the replacement probability. In particular, even though replacement beliefs are much higher in the take-games than in the donation game, the result that subjects do not make use of the replacement excuse, first generated in the donation

<sup>8</sup> Only 2 of 204 subjects stated a belief of less than 5 percent, which indicates that the vast majority of MTurkers understood the incentive structure. 4 subjects stated a belief of 5 percent, which could reflect a true belief of 0 percent.

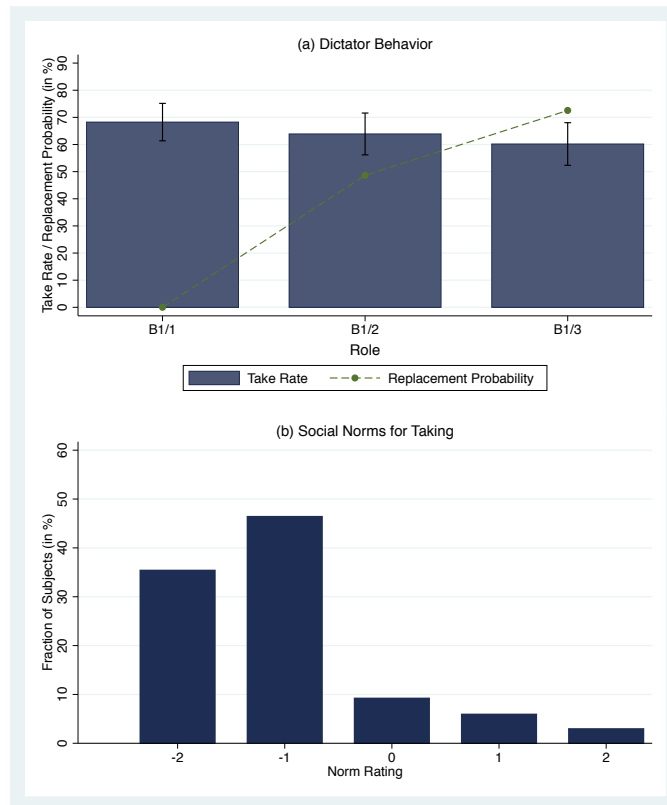


Figure 3.3: Take rates and social norms in the take game

*Note:* a) The bars show the fraction of first movers in TG-1, TG-2, and TG-3 who took the money. B1/1 denotes player 1 in TG-1, B1/2 player 1 in TG-2, and B1/3 player 1 in TG-3. Error bars depict 95% confidence intervals. The dotted line shows the empirical probability that at least one of the subsequent players takes the money if the first mover does not take it. b) This figure shows the distribution of norm ratings for the decision of a first mover to take the money. The ratings are pooled across TG-1, TG-2, and TG-3. The ratings are coded as follows: -2 “very socially inappropriate”, -1 “somewhat socially inappropriate”, 0 “neutral: neither socially inappropriate nor socially appropriate”, 1 “somewhat socially appropriate”, 2 “very socially appropriate”.

game, is replicated in the take-games.<sup>9</sup> We summarize this finding in the following.

<sup>9</sup> Note that the number of players is not constant between our conditions with and without replacement. In our take games, for example, B1 might take the money from A in TG-1, where no other B can observe her choice, but not in TG-2 or TG-3, where her choice is observed by one or two other Bs. If B1 is sensitive to the size of the “audience,” this could lead to lower take-rates in TG-2 or TG-3 than in TG-1. However, interactions on MTurk are highly anonymous, rendering it unreasonable that MTurkers care about their “social image” given that the identities of the interacting MTurkers are unknown and subjects are geographically dispersed across the U.S. Nevertheless, to exclude the existence of an “audience effect” we conducted a control condition that is identical to TG-1, except that two passive “spectators” are added, each receiving 0.5 USD and getting informed about B1’s decision. We collected 107 novel observations for B1 in TG-1 and 109 observations for B1 in the condition with spectators, thus 650 MTurkers participated in the control study in total. The experimental instructions are in the appendix. We find that the take-rates of B1s are not significantly different with and without spectators, 56.9 percent (62 of 109) and 61.7

**RESULT 3 (MORAL STEADFASTNESS IN THE TAKE GAMES WITHOUT PUNISHMENT):** *Subjects do not use the replacement excuse in the take game. The possibility that subsequent players B can replace an earlier player B's decision not to take the money from player A does not affect take-rates.*

Next we validate that players B face a moral decision in the take games. Panel b of [Figure 3.3](#) shows the distribution of the social norm evaluations pooled across the three conditions of the take game without punishment. In total, 82 percent of the subjects thought that player B's decision to take the money from player A is either "very socially inappropriate" or "somewhat socially inappropriate". The modal response is "somewhat socially inappropriate," chosen by 46 percent of subjects. There is no significant difference in the norm ratings between TG-1, TG-2, and TG-3 (Kruskal-Wallis test,  $H(2)=3.911$ ,  $p=0.141$ ). Hence, as in the donation game, the possibility that the alternative choice of not taking the money can be replaced in TG-2 and TG-3 does not decrease the social inappropriateness of the decision to take the money. This is summarized in the following.

**RESULT 4 (TAKE GAMES HAVE MORAL DIMENSION):** *There is a clear social norm that taking away money from player A in the take games is inconsistent with proper and moral behavior. More than 80 percent of subjects rate the decision to take the money as either "somewhat socially inappropriate" or "very socially inappropriate".*

Finally, we report the data from the take games with punishment. First, the take-rates of players B1 are very similar in all three conditions, 36.6 percent (37 of 101) in TGwP-1, 32.1 percent (36 of 112) in TGwP-2, and 25.0 percent (25 of 100) in TGwP-3. Again, if anything, the take-rates are lower in conditions TGwP-2 and TGwP-3 than in TGwP-1, but these differences are not significant ( $p=0.200$ , Pearson's chi-square test). We obtain this result even though the replacement probability increases from 0 (by design) in TGwP-1 to 0.29 in TGwP-2, and to 0.47 in TGwP-3. The take-rates of players B2 in TGwP-2 and of players B2 and B3 in TGwP-3 are very similar, 29.5 percent (33 of 112), 28.0 percent (28 of 100), and 27.0 percent (27 of 100), respectively. We cannot reject that the decisions of players B in all three conditions with punishment and in all roles originate from the same distribution ( $p=0.235$ , Pearson's chi square test). We summarize the second replication of Result 1 as follows.

**RESULT 5 (MORAL STEADFASTNESS IN THE TAKE GAMES WITH PUNISHMENT):** *Subjects do not use the replacement excuse in the take game with punishment.*

percent (66 of 107), respectively ( $p=0.281$ , Fischer exact test, one-sided). We conclude that audience effects do not affect our results.

The second observation that can be made is that the threat of punishment significantly reduces the take-rate compared to the treatments without punishment ( $p < 0.001$  for all possible bilateral comparisons, Fisher exact test, one sided). While this finding is not surprising as such, it proves that the MTurkers react sensibly to incentives. Hence, the absence of the replacement effect in our take games is not driven by a general insensitivity of MTurkers to our experimental variations.

We finally analyze the punishment behavior of players A, which allows for a different test of whether individuals use the replacement excuse. Specifically, do players A accept possible replacement as an excuse for selfish behavior by players B? The data show that this is not the case. In condition TGwP-2, B1 and B2 were punished at almost identical levels, leading to an average punishment spending of 0.026 USD for both types of players B. In condition TGwP-3, the average amount spent for the punishment of B1, B2, and B3 amounts to 0.019, 0.019, and 0.021 USD, respectively ( $p = 0.827$ , Friedman test). That is, within the different conditions, players A do not account for the replacement excuse when they make their punishment choices. This finding is consistent with our previous results showing that the possibility of replacement does neither affect take-rates nor social norms. We summarize the punishment data in the following.<sup>10</sup>

**RESULT 6 (REPLACEMENT EXCUSE DOES NOT DEFLECT PUNISHMENT):** *All players B are punished equally for taking away the money from player A within our experimental conditions. That is, taking away the money is not excused by the argument that the alternative choice not to take away the money might be replaced.*

### 3.4 ULTIMATUM GAMES WITH RESPONDER COMPETITION

Research on ultimatum games has shown that responders are more likely to accept an unfair offer if there are other responders who could replace the decision to reject the offer (Fischbacher, Fong, and Fehr, 2009; Grosskopf, 2003). Hence, the force of the replacement excuse seems to apply for responder behavior in ultimatum games. However, ultimatum games with responder competition are only appropriate to study moral behavior in markets if responders actually face a moral decision. In this section we show empirically that actions of responders who respond to unfair offers are not subject to prevailing social norms. We replicate the reaction of responders to competition in a version of the ultimatum game with responder competition that

<sup>10</sup> The average spending for punishment of selfish players B1 in TGwP-1 is 0.029 USD. Average punishment thus appears to be lower in conditions with a larger number of players B, but averaged over all players B only the difference between punishment spending in TGwP-1 and TGwP-3 is significant ( $p = 0.007$ , Mann-Whitney U test).



is comparable to the take game with respect to its structure, complexity, and underlying subject pool, and measure the social norm for a responder's decision to accept an unequal offer.

### *Experimental Design*

To approximate the complexity of the take game, we consider a simple ultimatum game, where a pie of 1 USD can be split between a proposer, player A, and a responder, player B. We manipulate the probability that a responder's decision to reject an unfair offer is replaced by another responder in a series of three conditions.

- In the *Ultimatum Game 1 (UG-1)* there is only a single responder, player B. First, player A decides whether to implement the equal split or to offer an unequal split, keeping 90 percent of the share. If player A chooses the equal split, the game ends and both player A and player B receive 0.5 USD each. If player A offers the unequal split, player B decides whether to accept or to reject the offer. If player B accepts the offer, the two players receive their respective shares; i.e., player B receives 10 percent and player A receives 90 percent. If player B rejects the offer, both players receive a payoff of zero.
- In the *Ultimatum Game 2 (UG-2)*, there are two responders, player B1 and player B2. If player A chooses the equal split, the game ends, player A and player B receive 0.5 USD each and player B2 receives nothing. If player A offers the unequal split, player B1 moves first and can either reject or accept the offer. If player B1 rejects the unequal offer player B2 can accept the offer and thereby replace the decision of player B1 to reject. If both player B1 and player B2 reject the unequal offer, all players receive a payoff of zero and the equal distribution is implemented. If one of the responders, player B1 or player B2, accepts the unequal offer, player A receives 90 percent of the share, the accepting responder receives 10 percent of the share, and the other responder receives nothing.
- In the *Ultimatum Game 3 (UG-3)*, the chain of players B1 and B2 is extended by player B3, who can accept the unequal offer if both player B1 and player B2 reject it.

For each treatment we measure the social norm associated with B1's decision to accept an unequal offer. Moreover, we measure the social norm for A's decision to offer the unequal split and the beliefs about the probability that B1 will be replaced (i.e. one of the following responders accepts the offer) in UG-2 and UG-3. We use the same tools for measuring social norms and beliefs as we used in the take game and the donation game.

To rule out that social norms elicited on MTurk are unique to the particular subject pool, we also measure social norms for responder behavior in the lab, based on a version of the ultimatum game with responder competition that has already been studied in previous research. In the experimental setup of Fischbacher, Fong, and Fehr (2009) a proposer offers an integer share of total surplus of 100 money units. In the baseline condition there is only a single responder who can either accept or reject the offer. If the offer is accepted, both players receive their respective shares. If the offer is rejected, both players receive a payoff of zero. In the competition treatments at least two responders decide simultaneously whether to accept or reject the offer. If more than one responder accepts the offer, the responder who receives the share is randomly determined. If only one responder accepts the offer, the proposer and the accepting responder receive their respective shares. If all responders reject the offer, all players end up with a payoff of zero. Fischbacher, Fong, and Fehr (2009) find that acceptance rates of unfair offers are significantly higher in the competition treatments than in the baseline condition without competition. For example, if a proposer offers 10 percent of the total surplus, 80 percent of responders in the baseline condition reject the offer. However, in the competition treatment with two responders, only 55 percent of responders reject the same offer. Following the same procedures as in the other treatments, we elicit social norms in both the ultimatum game without competition and the ultimatum game with two competing responders for accepting an offer of 10 percent. Moreover, we measure the social norms for offering 10 percent as a proposer in the baseline condition and the beliefs that a responder will be replaced (i.e. the other responder decides to accept) given an offer of 10 percent in the competition treatment. Subjects are always presented the original instructions used by Fischbacher, Fong, and Fehr (2009).

#### *Procedural Details*

General procedures for the ultimatum game closely follow those for the take game. In total 1'784 subjects on MTurk participated and earned on average 1.13 USD. Subjects participated only once in treatments involving the ultimatum game.

The lab measures were taken at the decision laboratory of the Department of Economics at the University of Zurich, as was the case in the original study of Fischbacher, Fong, and Fehr (2009). The data were collected within 15 minutes at the end of other experiments that were unrelated to the ultimatum game. Subjects participated only once in the treatments involving the ultimatum game and earned on average 3.27 CHF in addition to their show-up fee and payoffs earned from other parts of the respective session.

### *Hypotheses*

The treatment manipulation in the ultimatum game is centered on the number of players who can replace the decision of B1 to reject an unfair offer. UG-1 resembles a standard mini ultimatum game, where the decision of B1 leads to a certain outcome. However, in UG-2 (and UG-3) the decision of B1 to reject an unfair offer does not necessarily reduce the payoff of A, since B2 (or B3) can accept the unfair offer if B1 rejects it. Previous research has shown that in this class of games responders react to competition by being more likely to accept an unfair offer (Fischbacher, Fong, and Fehr, 2009; Grosskopf, 2003). Hence, we expect the following result:

**HYPOTHESIS 4 (REPLACEABILITY INCREASES THE ACCEPTANCE OF UNFAIR OFFERS IN THE ULTIMATUM GAME):** *The fraction of players B1 who accept an unfair offer is higher in the conditions with replacement, UG-2 and UG-3, than in the condition without replacement, UG-1.*

In contrast to taking the money in the donation game or the take game, the decision to accept an unfair offer in the ultimatum game does not impose harm on another person. On the contrary, accepting the offer maximizes the payoff of both player B1 and player A. Moreover, since there is no repeated public good setting, where the whole group would potentially benefit from punishing a defector, we do not expect to find a social norm that prescribes to punish a proposer who offers an unequal split.

**HYPOTHESIS 5 (ACCEPTING AN UNFAIR OFFER IN THE ULTIMATUM GAME IS NOT SOCIALLY INAPPROPRIATE):** *The modal response to our social norm measure for the decision to accept an unfair offer is "neutral: neither socially appropriate nor inappropriate".*

### *Results*

Panel a of [Figure 3.4](#) compares the acceptance rate of unfair offers and the respective replacement probabilities among the first movers in UG-1, UG-2, and UG-3. Without competition, only 51.4 percent of first mover responders accept an unfair offer; however, 73.6 percent of such offers are accepted if another responder can replace the decision of the first mover to reject the unfair offer ( $p=0.001$ , Fisher's exact test). The acceptance rate of unfair offers increases even further to 85.2 percent if there are two potential "replacers", an increase that is significant with respect to responders in UG-1 ( $p<0.001$ , Fisher's exact test) and first mover responders in UG-2 ( $p=0.03$ , Fisher's exact test).

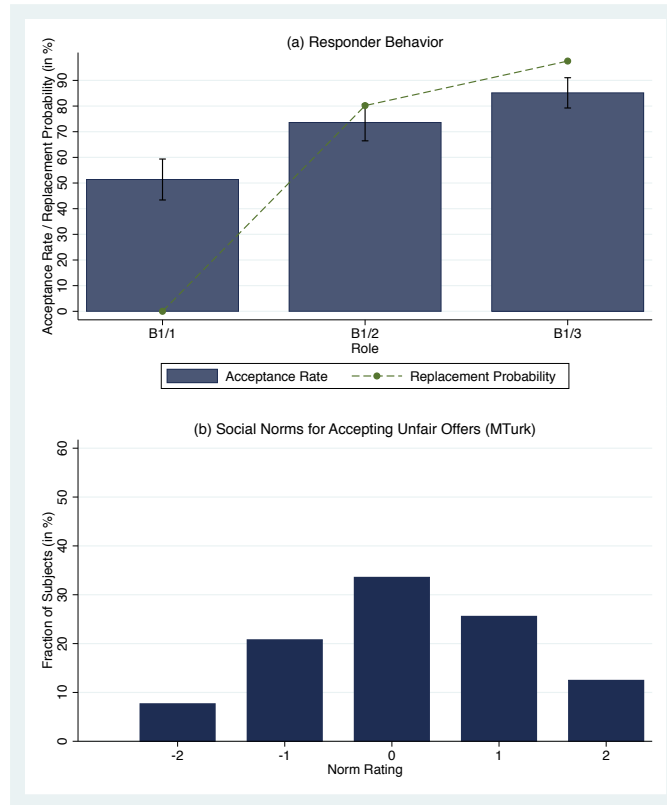


Figure 3.4: Acceptance rates and social norms in the ultimatum game

*Note:* a) The bars show the fraction of first movers in UG-1, UG-2, and UG-3 who rejected the offer. B1/1 denotes player 1 in UG-1, B1/2 player 1 in UG-2, and B1/3 player 1 in UG-3. Error bars depict 95% confidence intervals. The dotted line shows the empirical probability that at least one of the subsequent players accepts the offer if the first mover rejects it. b) This figure shows the distribution of norm ratings for the decision of a first mover to accept the offer. The ratings are pooled across UG-1, UG-2, and UG-3. The ratings are coded as follows: -2 “very socially inappropriate”, -1 “somewhat socially inappropriate”, 0 “neutral: neither socially inappropriate nor socially appropriate”, 1 “somewhat socially appropriate”, 2 “very socially appropriate”.

**RESULT 7:** *In the ultimatum game with responder competition, responders react to an increase in the replacement probability. The possibility that subsequent responders can replace the decision to reject an unfair offer significantly increases the rate at which unfair offers are accepted.*

Panel b of Figure 3.4 shows the distribution of social norm evaluations for a responder’s decision to accept a 10 percent offer on MTurk. Consistent with our findings in the donation game and the take game, the social norms differ neither among UG-1, UG-2, and UG-3 ( $H(2)=1.032$ ,  $p=0.5968$ , Kruskal-Wallis test) nor between the ultimatum game without competition and the ultimatum game with two competing responders in the lab ( $p=0.6904$ , Mann Whitney U test). The distributions of the evaluations reveal that there is no mutual understanding about what constitutes right conduct if someone

has to respond to an unfair offer in the ultimatum game. In total, 71.6 percent of subjects on MTurk and 72.7 percent of subjects in the lab choose either the neutral option or one of the options that evaluate the action as socially appropriate. The neutral option, chosen by 33.6 percent of subjects on MTurk and 31.1 percent of subjects in the lab, is the modal choice in both subject pools. The normalized average ratings of 0.14 on MTurk and 0.25 in the lab are both close to zero. The social norms on MTurk for responder behavior in the ultimatum game do not differ from those in the lab ( $p=0.425$ , Mann Whitney U test); however, the social norms on MTurk for responder behavior are significantly different from those for dictator behavior in the take game ( $p<0.0001$ , Mann Whitney U test). We can conclude that responders do not seem to face a moral decision when they have to respond to an unfair offer. Our results cast doubt on the hypothesis that a meta-norm to punish norm violators causes costly punishment behavior (e. g. Axelrod, 1986). However, our results are in line with empirical evidence suggesting that the main motivation underlying costly punishment behavior is a desire for retribution (Carlsmith, 2006; Crockett, Özdemir, and Fehr, 2014) or negative emotions, such as anger, in general (Fehr and Gächter, 2002; Yamagishi et al., 2009).

However, unlike responder behavior, proposer behavior is subject to prevailing social norms. 81.9 percent of subjects on MTurk and 69.5 percent of subjects in the lab rate the decision to make the unequal offer as either very socially inappropriate or somewhat socially inappropriate. The modal response is “somewhat socially inappropriate”, with 48.6 percent of subjects on MTurk and 45.8 percent of subjects in the lab choosing this option. The evaluation of a proposer’s decision to make an unequal offer does not depend on the number of responders (MTurk:  $H(2)=2.007$ ,  $p=0.3665$ , Kruskal-Wallis test; Lab:  $p=0.816$ , Mann Whitney U test), but differs significantly from the evaluation of a responder’s decision to accept such an offer, both on MTurk ( $p<0.0001$ , Mann Whitney U test) and in the lab ( $p<0.0001$ , Mann Whitney U test).

**RESULT 8:** *A social norm exists that proposing the unequal split in the ultimatum game is inappropriate. However, there is no social norm that a responder should reject an unfair offer. Only 28.4 percent of subjects on MTurk and 27.3 percent of subjects in the lab evaluate the decision to accept an unfair offer as either somewhat or very socially inappropriate, while the modal choice in both subject pools is “neutral: neither socially appropriate nor inappropriate”.*

Like the beliefs in the take game, the beliefs in the ultimatum game are highly dispersed and lead to an average belief of around 60 percent in both treatments. The beliefs on MTurk are not significantly different between the take game and ultimatum game in both TG-2 with UG-2 ( $p=0.144$ , Mann Whitney U test) and TG-3 with UG-3

( $p=0.822$ , Mann Whitney U test). Hence, different beliefs are unlikely to explain the different effects of the replacement probability on behavior between the take game and the ultimatum game.

### 3.5 CONCLUSION

The replacement excuse, the argument that “if I don’t do it, someone else will,” is a potentially powerful force leading to the erosion of moral behavior in competitive markets. In this paper, we study the replacement excuse in a large-scale series of laboratory and online experiments with more than 5’800 subjects.

We find that the force of the replacement excuse depends on the social norm associated with the underlying action, which we measure by use of coordination games (Krupka and Weber, 2013). Subjects are insensitive to the replacement excuse if a clear norm exists that the underlying action is inconsistent with moral behavior. In these cases, subjects behave as if they focus only on their own actions, not on the ultimate outcomes. But if no mutual understanding exists about what constitutes moral conduct, then subjects follow the replacement argument. In these cases, subjects appear to be driven by the expected outcome of an interaction, but not by their own actions, which can be replaced. Our results provide novel insights into the effects of market institutions on moral behaviors by showing the power but also the limits of the replacement excuse.

It remains an open question whether social norms systematically change when an action is taken in a market context as compared to other institutions. Furthermore, we have not investigated the dynamics of social norms when the replacement argument takes on extreme values. Social norms might change discontinuously when replacement becomes a certainty – for example because a possible “replacer” has already made a binding decision. Some models of norm compliance, like the one in López-Pérez (2008), predict a sudden change in the social evaluation of an action once the replacement probability reaches unity, since a decision path that leads to a fair outcome would cease to exist. Further studying the impact of the replacement argument on moral behavior in markets, and more generally, studying the impact of market institutions on moral behavior is an important frontier in economics.

## THE SUPERIORITY OF DECENTRALIZATION IN SOCIAL NORM ENFORCEMENT

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### ABSTRACT

In this paper we introduce private imperfect monitoring and information acquisition to public goods games with punishment and study the relative performance of different social norm enforcement institutions in sustaining cooperation. A comparison between centralized and decentralized social norm enforcement reveals a tradeoff between Type I errors of punishment (sanctioning a cooperator) and Type II errors of punishment (failing to sanction a defector). Decentralization achieves significantly higher cooperation rates than centralization, suggesting that centralized social norm enforcement institutions per se, without being associated with other performance-enhancing features, are not as effective as peer-to-peer punishment institutions in resolving social dilemmas. Moreover, we find substantial demand for additional information about the contribution decisions of other group members. By establishing a "standard of proof" before exerting punishment, subjects reduce Type I errors of punishment, boosting cooperation rates as compared to an environment where costly information acquisition is not possible.

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#### 4.1 INTRODUCTION

Social dilemmas constitute one of the fundamental problems that societies need to solve to achieve efficient outcomes. According to Ostrom (1998) “social dilemmas are found in all aspects of life, leading to momentous decisions affecting war and peace as well as the mundane relationships of keeping promises in everyday life” (p. 1). Social dilemmas arise whenever it is a dominant strategy for agents to make a socially defective choice, but everyone is better off if all agents choose the socially cooperative alternative. A canonical example for a social dilemma is the public goods game, where the social optimum is achieved if all agents contribute to the public good, but each agent has an incentive to free ride on the contributions of other group members. Empirical research has shown that cooperation in public goods games can be sustained if punishment options exist, even if they are costly, since subjects are willing to bear costs to punish group members who violate the social norm of conditional cooperation, whereas cooperation typically breaks down if sanctioning mechanisms are not available (Fehr and Gächter, 2000; Ostrom, Walker, and Gardner, 1992; Yamagishi, 1986). The literature on social norm enforcement in public goods games has largely been based on a simplifying assumption about the underlying monitoring technology – the assumption that all actions of other group members are perfectly observable before punishment decisions are made. Recently, this assumption has been relaxed to allow for imperfect *public* signals about the contribution decisions of other subjects, leading to monitoring environments where all agents receive identical noisy signals (Ambrus and Greiner, 2012, 2015; Fischer, Grechenig, and Meier, 2013; Grechenig, Nicklisch, and Thöni, 2010; Nicklisch, Grechenig, and Thöni, 2015). However, a single public record of an agent, providing identical information to all observers, rarely exists in reality. Instead, monitoring is often private in nature such that signals possibly differ among observers. In this paper we experimentally study social norm enforcement in social dilemma situations in a more realistic imperfect monitoring environment, where agents receive noisy *private* signals about the actions of other group members.

In particular, we are interested in the implications of private imperfect monitoring for the relative effectiveness of different social norm enforcement institutions in sustaining cooperation. Understanding the effects of different punishment institutions on cooperation is important to better explain the emergence of particular sanctioning mechanisms and to help design effective social norm enforcement institutions. For example, organizations can prioritize vertical control, where superiors monitor the behavior of employees, or horizontal control, where compliance with productivity targets and behavioral norms is monitored by peers (e.g. McAllister, 1995). Using a public goods



game, we compare a decentralized peer-to-peer punishment institution with a centralized punishment regime, where all sanctioning power is concentrated in the hands of a single, randomly selected authority. All group members, including the authority, receive a private signal about the binary contribution decisions of each group member, a signal that is with 90% probability true and with 10% probability false. In the exogenous monitoring condition the amount of information about the contribution decisions of other group members is exogenously imposed, whereas in the endogenous monitoring treatment agents can acquire additional pieces of information. To the best of our knowledge, this paper is the first that introduces imperfect private monitoring and the possibility to acquire further information in the public goods game with punishment.

Our results suggest that an imperfect monitoring environment with private signals has important implications for the relative performance of different social norm enforcement institutions. Decentralization of punishment induces higher cooperation rates than centralization, under both exogenous and endogenous private imperfect monitoring. The literature has suggested that centralization of punishment might mitigate potential disadvantages of peer-to-peer punishment regimes. First, decentralized punishment institutions can be prone to antisocial punishment, i.e. the intentional punishment of cooperators, rendering it difficult to sustain cooperation (Cinyabuguma, Page, and Putterman, 2006; Gächter and Herrmann, 2009, 2011; Herrmann, Thöni, and Gächter, 2008). Second, since agents in the decentralized system have incentives to free-ride on the altruistic punishment decisions of other agents (Fehr and Gächter, 2002), centralization might mitigate the second order public good problem of punishment. Third, coordinating the appropriate severity of sanctions might prove more difficult in a decentralized than in a centralized regime. However, empirical studies comparing decentralized and centralized punishment institutions do not find evidence for a superior performance of centralization in terms of cooperation rates (Fischer, Grechenig, and Meier, 2013; O’Gorman, Henrich, and Van Vugt, 2009). We contribute to the literature by showing that in a more realistic monitoring environment cooperation rates are higher when sanctioning power is decentralized. Our findings imply that in order to achieve similar cooperation rates as in a peer-to-peer punishment setting, centralized punishment institutions need to be associated with additional features that are potentially beneficial for cooperation, such as a commitment to sanctioning rules (Andreoni and Gee, 2012; Putterman, Tyran, and Kamei, 2011; Tyran and Feld, 2006) or the election of the authority by group members (Baldassarri and Grossman, 2011).

Why does the decentralization of social norm enforcement lead to higher cooperation rates than centralization in private imperfect monitoring environments? Under private imperfect monitoring agents

have to make punishment decisions based on noisy signals; hence, punishment decisions are more susceptible to errors than in an environment with perfect information. We find that the choice of the punishment institution involves a tradeoff between different types of punishment error, the punishment of a cooperator (Type I error of punishment) and the failure to punish a defector (Type II error of punishment; see Dickson, Gordon, and Huber, 2009). While the centralized regime performs better at avoiding punishment of cooperators, the decentralized institution is superior in sanctioning defectors. In the decentralized institution both defectors and cooperators face a higher probability of receiving punishment, but the punishment of cooperators remains almost always mild. Our results show that the benefits of reduced Type I error rates in the centralized punishment institution on cooperation rates are outweighed by the benefits of lower Type II error rates in the decentralized setting. The differing relative advantages of the decentralized and the centralized sanctioning regimes with respect to the two types of punishment error are a consequence of the underlying monitoring structure. To see how private imperfect monitoring affects punishment error rates in the two institutions, consider the simple case of exogenous imperfect monitoring, where each agent receives a single informative signal about the contribution decision of each group member. Suppose agents are only willing to exert punishment if they receive the signal “defector”. Then, a given defector remains unpunished if all agents who have punishment power and who are willing to punish norm violators receive a false signal about the defector. In the decentralized setting there are potentially several agents who are willing to punish a defector and each of those agents must receive a false signal to let a defector escape punishment. In contrast, a false signal received by the authority about a defector is sufficient to induce a Type II error of punishment in the centralized punishment institution. On the other hand, in the decentralized institution cooperators face a higher likelihood of receiving punishment, because a cooperator remains unpunished only if all peers receive a true signal about the action of the cooperator, whereas in the centralized regime, a true signal received by the authority suffices to avoid a Type I error of punishment. However, if monitoring is public, the monitoring technology does not lead to an asymmetry in the prevalence of Type I and Type II errors of punishment between centralized and decentralized punishment institutions, because all agents receive an identical public record.

In reality there are often possibilities to seek further information about the actions of other group members before making punishment decisions. Hence, we ask how the possibility to improve monitoring accuracy by acquiring additional signals affects outcomes and behavior. Understanding information acquisition behavior and its implications for cooperation in different social norm enforcement institutions

is important, because the design of institutions not only shapes how punishment is exerted, but also whether and at which costs it is possible to acquire further information about the actions of other group members. For example, organizations can increase workflow transparency, making it easier for employees to monitor the behavior of peers. If monitoring is endogenous, we find substantial demand for additional information about the actions of other group members. In particular, there is a behavioral tendency to focus information acquisition primarily on agents who are signaled to be defectors. Therefore, subjects are willing to bear additional costs to reduce the risk of sanctioning a cooperator. By establishing a “standard of proof” before exerting punishment agents significantly reduce the rate of Type I punishment errors under endogenous monitoring, boosting cooperation rates as compared to an environment where additional information cannot be acquired. The reduction in Type I error rates counteracts a main weakness of the decentralized punishment institution, leading to stable cooperation rates of around 90%.<sup>1</sup>

The remainder of the paper is organized as follows. [Section 4.2](#) describes the experimental design, [Section 4.3](#) shows the results of the experiment, and [Section 4.4](#) concludes.

## 4.2 EXPERIMENTAL DESIGN

All treatments are based on a linear public goods game with punishment, which is repeated for 25 periods. At the beginning of the experiment subjects are randomly allocated into groups of five, each group consisting of four Peers ( $P_1$ - $P_4$ ) and one Authority (A). Groups and roles remain fixed throughout the experiment, but the identification number of Ps is randomly assigned in each period to avoid reputation effects.

<sup>1</sup> The focus of information acquisition behavior on reducing Type I punishment errors is consistent with the findings of Dickson, Gordon, and Huber (2009), who study behavior in public goods games with centralized punishment in different monitoring conditions. In their False Positives treatment, signals can only be inaccurate if the underlying true decision is to cooperate, whereas in their False Negatives treatment, signals can only be inaccurate if the true underlying decision is to defect. Dickson, Gordon, and Huber (2009) find that, unlike in the False Negatives treatment, in the False Positives Treatment authorities are reluctant to use punishment, because they want to avoid the risk of punishing a cooperator. The reluctance to punish in the False Positives treatment is highly detrimental for cooperation, since defectors remain unpunished, leading to a so called “false positives trap”. However, with a signal accuracy of only 60%, the monitoring technology used in Dickson, Gordon, and Huber (2009) delivers only very limited information to the authority, causing high error probabilities of punishment. In our study, where the signal accuracy is 90%, subjects do not fall into a “false positives trap”. Instead, they are willing to take the risk of punishing a cooperator in order to enforce cooperation. However, subjects use opportunities to reduce the risk of Type I errors by acquiring further information before punishing an alleged defector.

		INSTITUTION	
		Decentralized	Centralized
MONITORING	Exogenous	EX-DEC	EX-CEN
	Endogenous	END-DEC	END-CEN

Table 4.1: Overview of treatments

Every period has three stages: Contribution (Stage 1), Monitoring (Stage 2), and Punishment (Stage 3). While the contribution stage remains the same across all treatments, the other two stages differ depending on the treatment. We implement a 2x2 factorial between subject design by varying both the monitoring technology (exogenous vs endogenous) and the punishment institution (decentralized vs centralized), which defines who holds the power to acquire new signals and to exert punishment. In the contribution stage Ps make a binary choice whether or not to contribute their endowment to the public good. Contributions are doubled and then redistributed to all group members. In all treatments, each group member, including player A, receives one initial imperfect private signal about the contribution decisions of other Ps. Specifically, with 90% probability the signal corresponds to the actual contribution of the respective P and with 10% probability the signal provides false information. In the treatments with exogenous monitoring (treatments EX-DEC and EX-CEN) the initial signal is the only signal that group members have access to. In the treatments with endogenous monitoring (treatments END-DEC and END-CEN) it is possible to acquire further signals at a cost. In the decentralized institutions (treatments EX-DEC and END-DEC) Ps can punish each other with a punishment technology of 1:4 and, if available, acquire further signals (treatment END-DEC), while A plays only a passive role in these treatments. In the centralized institutions (treatments EX-CEN and END-CEN) punishment and, if available, information acquisition power is delegated to A. To hold endowments and total costs constant across treatments, A and Ps share the costs of punishment and monitoring (if applicable) in all treatments. Table 4.1 provides an overview of the treatments and the respective labels.

The following section describes the three stages and the differences between the treatments in more detail. Table 4.2 lists the implemented values of all parameters (1 Token = 0.05 CHF  $\approx$  0.052 USD).

#### *Stage I: Contribution*

In the contribution stage, which remains the same across all treatments, each peer  $P_i$  receives an endowment of  $e^{PG}$  and has to decide whether to contribute the whole endowment to the public good ( $c_i = 1$ ) or not ( $c_i = 0$ ). We use a binary choice set to keep this stage

and the interpretation of a false signal as simple as possible. Since players A are passive in this stage and cannot contribute to the public good, they do not receive any endowment. Contributions to the public good are multiplied by  $M$  and distributed back equally to all five group members; hence, marginal per capita return of a contribution is given by  $M/5$ . Players A are included as beneficiaries of the public good, because otherwise the incentives for exerting punishment would not be comparable between the decentralized and the centralized punishment treatments. Parameter  $M$  is chosen such that the game constitutes a social dilemma – it is strictly dominant not to contribute to the public good, but if all peers defect, the resulting outcome is Pareto inferior as compared to the case where all peers cooperate. The monetary payoff of  $P_i$  from stage I is given by

$$\pi_{P_i}^I = e^{PG}(1 - c_i) + \frac{M}{5} \sum_{j=1}^4 e^{PG} c_j.$$

A's payoff is given by

$$\pi_A^I = \frac{M}{5} \sum_{j=1}^4 e^{PG} c_j.$$

### *Stage II: Monitoring*

In the monitoring stage subjects receive information about the contribution decisions of other group members. Each group member  $i$  receives an individual (private) signal  $s_{i,P_j}^1$  about the contribution of  $P_j$  ( $j \neq i$ ) to the public good; hence A receives four signals, one for each  $P$ , and each  $P$  receives three signals, one for each of the other three  $P$ s. The signal is given by

$$s_{i,P_j}^1 = \begin{cases} e^{PG} c_j & \text{with probability } \lambda \\ e^{PG} \tilde{c}_j & \text{with probability } 1 - \lambda \end{cases}$$

where  $\tilde{c}_j = 1$  if  $c_j = 0$  and  $\tilde{c}_j = 0$  if  $c_j = 1$ . With probability  $\lambda$  the signal reflects the true underlying contribution decision of the respective peer, and with probability  $1 - \lambda$  the signal states the opposite of the true underlying contribution decision of the respective peer. Since signals are private,  $s_{i,P_j}^1$  is not necessarily the same for all  $i$ ; hence, while some subjects might receive a false signal about a given peer, others might receive a true signal. In this stage subjects receive new endowments, which can be used for information acquisition or punishment, depending on the treatment. Endowments are kept constant across treatments –  $P$ s are endowed with  $e^{MP}$ , and A receives  $4e^{MP}$  in all treatments. In treatments with exogenous monitoring, i.e. EX-DEC and EX-CEN, stage II ends after subjects have received their ini-

tial signals. In the treatments with exogenous monitoring,  $P_i$ 's profit from stage II,  $\pi_{P_i,T}^{II}$ , is given by

$$\pi_{P_i,EX-DEC}^{II} = \pi_{P_i,EX-CEN}^{II} = e^{MP}.$$

A's profit from stage II,  $\pi_{A,T}^{II}$ , is given by

$$\pi_{A,EX-DEC}^{II} = \pi_{A,EX-CEN}^{II} = 4e^{MP}.$$

**END-DEC ONLY** If monitoring is endogenous and punishment is decentralized, Ps have the option to acquire further signals about the contribution decisions of other group members.  $P_i$  can acquire at most two additional signals,  $s_{i,P_j}^2$  and  $s_{i,P_j}^3$ , about the contribution decision of each  $P_j$  ( $j \neq i$ ). Additional signals share the same properties as the first signal  $s_{i,P_j}^1$ . Buying a second ( $b_{i,P_j}^2 = 1$  if acquired, and  $b_{i,P_j}^2 = 0$  if not) or third ( $b_{i,P_j}^3 = 1$  if acquired, and  $b_{i,P_j}^3 = 0$  if not) signal generates costs of  $p^M$  for  $P_i$ , and for each signal that is acquired by a player  $P$ , player  $A$  also has to bear costs of  $p^M$ . In the END-DEC treatment,  $P_i$ 's profit from stage II,  $\pi_{P_i,END-DEC}^{II}$ , is given by

$$\pi_{P_i,END-DEC}^{II} = e^{MP} - p^M \sum_{k=2}^3 \sum_{j \neq i}^4 b_{i,P_j}^k.$$

A's profit from stage II,  $\pi_{A,T}^{II}$ , is given by

$$\pi_{A,END-DEC}^{II} = 4e^{MP} - p^M \sum_{k=2}^3 \sum_{i=1}^4 \sum_{j \neq i}^4 b_{i,P_j}^k.$$

**END-CEN ONLY** If monitoring is endogenous and punishment is decentralized,  $A$  has the option to acquire further signals about the contribution decisions of players  $P$ .  $A$  can acquire at most two additional signals,  $s_{A,P_j}^2$  and  $s_{A,P_j}^3$ , about the contribution decision of each  $P_j$ . Additional signals share the same properties as the first signal  $s_{i,P_j}^1$ . The signals acquired by  $A$  are visible to Ps as well, except for signals related to the own contribution decision. Formally,  $s_{i,P_j}^2 = s_{A,P_j}^2$  and  $s_{i,P_j}^3 = s_{A,P_j}^3$ , unless  $i = j$ . Acquiring a further signal generates costs of  $3p^M$  for  $A$ , and for each signal acquired by  $A$ , each  $P_i$  also bears costs of  $p^M$ . Let  $b_{A,P_j}^2 = 1$  and  $b_{A,P_j}^3 = 1$  if the respective signal is acquired, and  $b_{A,P_j}^2 = 0$  and  $b_{A,P_j}^3 = 0$  if the respective signal is not acquired. In the END-CEN treatment,  $P_i$ 's profit from stage II,  $\pi_{P_i,END-CEN}^{II}$ , is given by

$$\pi_{P_i,END-CEN}^{II} = e^{MP} - p^M \sum_{k=2}^3 \sum_{j \neq i}^4 b_{A,P_j}^k.$$

A's profit from stage II,  $\pi_{A,T}^{II}$ , is given by

$$\pi_{A,END-CEN}^{II} = e^{MP} - 3p^M \sum_{k=2}^3 \sum_{j \neq i}^4 b_{A,P_j}^k.$$

### Stage III: Punishment

**EX-DEC AND END-DEC** When punishment is decentralized, Ps have the possibility to punish each other. All the signals received in stage II remain available on the screen while the punishment decisions are made. Each  $P_i$  has to decide whether to punish ( $q_{i,P_j} = 1$ ) or not to punish ( $q_{i,P_j} = 0$ ) other group members  $P_j$ . For each positive punishment decision,  $P_i$  has to bear costs of  $p^S$ . Similar to the case in stage II, A has to bear the costs of  $p^S$  for each punishment decision. For each  $P_i$  who punishes  $P_j$  the period profit of  $P_j$  is reduced by  $S$ . In the decentralized settings,  $P_i$ 's profit from stage III,  $\pi_{P_i,T}^{III}$ , is given by

$$\pi_{P_i,EX-DEC}^{III} = \pi_{P_i,END-DEC}^{III} = -p^S \sum_{j \neq i}^4 q_{i,P_j} - S \sum_{j \neq i}^4 q_{j,P_i}.$$

A's profit from stage II,  $\pi_{A,T}^{II}$ , is given by

$$\pi_{A,EX-DEC}^{III} = \pi_{A,END-DEC}^{III} = -p^S \sum_{i=1}^4 \sum_{j \neq i}^4 q_{i,P_j}.$$

**EX-CEN AND END-CEN** When punishment is centralized, the whole punishment power is concentrated in the hands of A, who has the possibility to punish each  $P_i$  by choosing one of three punishment levels; the punishment choice set is given by  $q_{A,P_j} \in \{0, 1, 2, 3\}$ . A bears costs of  $q_{A,P_j} p^S$  for each  $P_j$ , and  $P_j$ 's profit is reduced by  $q_{A,P_j} S$ . Hence, the set of potential punishment levels that Ps can receive is identical between the decentralized and the centralized punishment institutions. For example, if the authority chooses punishment level  $q_{A,P_j} = 3$ , then  $P_j$  receives the same punishment as  $P_j$  would have received in the decentralized treatment if all three other Ps had chosen to punish  $P_j$ . For each  $q_{A,P_j}$ , each  $P_i$  bears costs of  $\frac{p^S}{3}$ . In the centralized settings,  $P_i$ 's profit from stage III,  $\pi_{P_i,T}^{III}$ , is given by

$$\pi_{P_i,EX-CEN}^{III} = \pi_{P_i,END-CEN}^{III} = -\frac{p^S}{3} \sum_{j \neq i}^4 q_{A,P_j} - S q_{A,P_i}.$$

A's profit from stage III,  $\pi_{A,T}^{III}$ , is given by

$$\pi_{A,EX-CEN}^{III} = \pi_{A,END-CEN}^{III} = -p^S \sum_{i=1}^4 q_{A,P_i}.$$

The total period profit is the sum of profits from stage I, II and III. The profit of  $P_i$  in treatment T is given by

$$\pi_{P_i,T} = \pi_{P_i,T}^I + \pi_{P_i,T}^{II} + \pi_{P_i,T}^{III},$$

and the profit of A is given by

$$\pi_{A,T} = \pi_{A,T}^I + \pi_{A,T}^{II} + \pi_{A,T}^{III}.$$

Parameter	Value	Description
$e^{PG}$	15 Token	Endowment for public good
$e^{MP}$	6 Token	Endowment for monitoring and punishment
$p^M$	1 Token	Price of acquiring one signal
$p^S$	2 Token	Price of punishment
$M$	2	Public good multiplier
$S$	8 Token	Severity of punishment
$\lambda$	0.9	Accuracy of signal

Table 4.2: Overview of parameters

Subjects were paid the sum of period profits over all 25 periods. Period profits could be negative, but total profits were capped at zero.<sup>2</sup>

#### *Methods and Procedures*

We conducted the experiment in March and June 2015 at the decision laboratory of the Department of Economics of the University of Zurich using the software z-Tree (Fischbacher, 2007). Subjects, mainly students from the University of Zurich or the Swiss Federal Institute of Technology in Zurich, were recruited using the software “hroot” (Bock, Baetge, and Nicklisch, 2014). Subjects participated only once in this experiment. In total we ran 12 sessions, each lasting around 90 minutes; 130 subjects participated in the EX-DEC treatment, 125 subjects in the EX-CEN treatment, 60 subjects in the END-DEC treatment, and 70 subjects in the END-CEN treatment. Subjects were seated at computer terminals located in separate carrels. After subjects took their randomly assigned seats, they read the printed instructions and answered control questions. Subjects received an average total payoff of 48.5 CHF ( $\approx$  50.2 USD), including the show-up fee of 15 CHF ( $\approx$  15.5 USD).

<sup>2</sup> Since all subjects finished the experiment with positive total profits, we did not have to enforce the non-negative payoff restriction.



## 4.3 RESULTS

*Cooperation Rates*

To analyze the impact of the underlying social norm enforcement institution and monitoring structure on cooperation levels, we use the cooperation rate as the key outcome variable – i.e. the fraction of subjects who contributed to the public good.

**RESULT 1:** *Under private imperfect monitoring, decentralization of social norm enforcement is more effective in sustaining cooperation than centralization. Cooperation rates in the decentralized punishment institution are significantly higher than in the centralized punishment institution, under both exogenous and endogenous monitoring.*

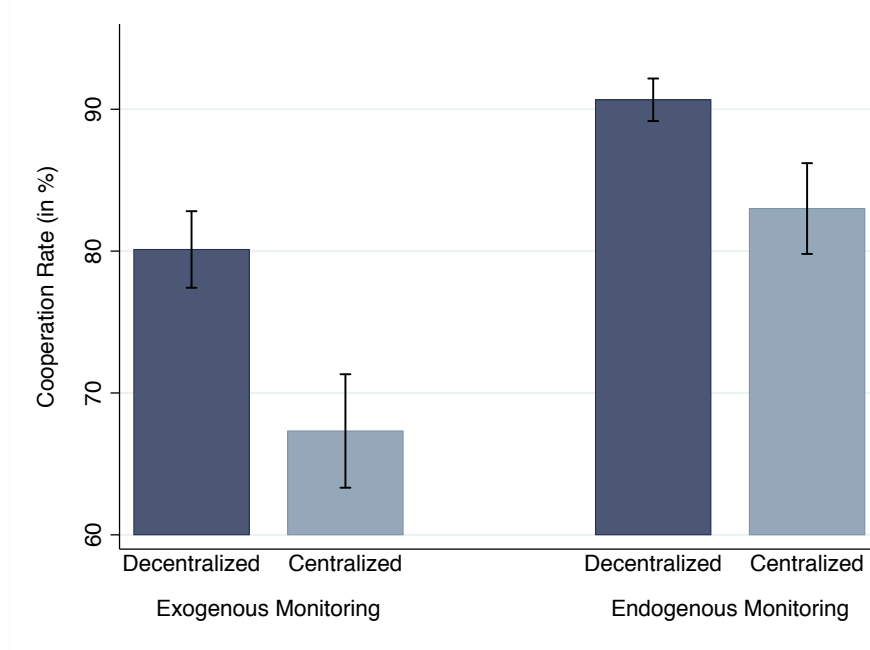


Figure 4.1: Cooperation rates

*Note:* This figure shows, for each treatment, the fraction of subjects who decided to contribute to the public good, pooled across all 25 periods. Error bars denote standard errors.

Figure 4.1 shows the cooperation rates in each of the four treatments, pooled across the 25 periods of interaction. Under exogenous monitoring, the cooperation rate decreases from 80.1% in the EX-DEC treatment to 67.3% in the EX-CEN treatment (Probit regression,  $p=0.007$ ).<sup>3</sup> Similarly, under endogenous monitoring, the cooperation rate of 90.7% in the END-DEC treatment is significantly larger than

<sup>3</sup> We compare binary outcome variables between treatments based on a Probit regression of the form  $\Pr(y_i = 1|x) = \Phi(\beta_0 + \beta_1 x_i)$ , where  $\Phi$  is the cumulative density function of the standard normal distribution,  $x$  is a treatment dummy, and  $y_i$  is a

the cooperation rate of 83% in the END-CEN treatment (Probit regression,  $p=0.017$ ). Figure 4.2 shows the evolution of cooperation over time in each for the four treatments. In all treatments cooperation rates start at comparable levels, suggesting that the initial contribution decision remains unaffected by the underlying social norm enforcement institution or monitoring structure. However, while cooperation rates deteriorate over time in centralized institutions, they remain relatively stable and show a slight downward trend only towards the end of the interaction in decentralized institutions.

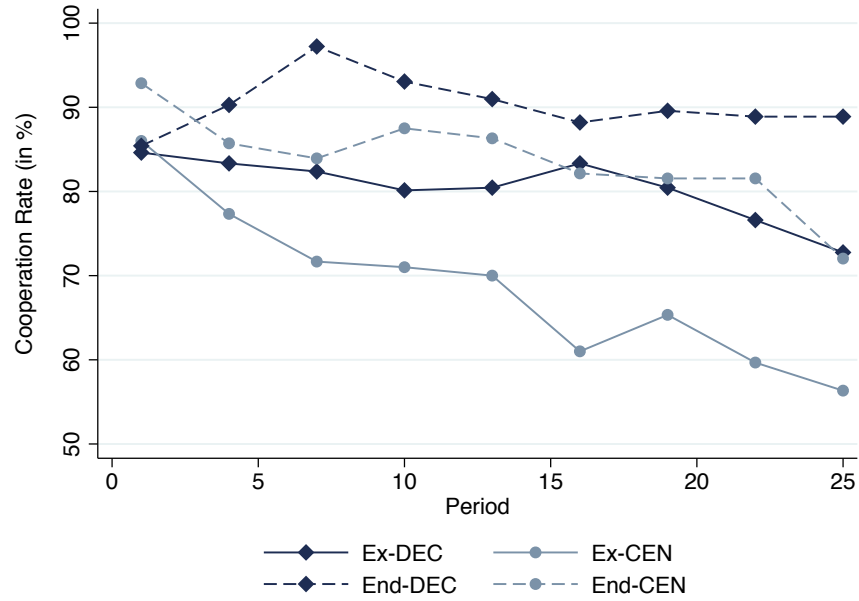


Figure 4.2: Cooperation rates over time

*Note:* This figure shows, for each treatment, the fraction of subjects who decided to contribute to the public good over all 25 periods.

**RESULT 2:** *The possibility to improve the quality of monitoring by paying for information leads to higher cooperation rates in both decentralized and centralized punishment institutions.*

With a contribution rate of 90.7%, decentralization achieves almost full contribution under endogenous monitoring, performing significantly better than the decentralization under exogenous monitoring (80.1%, Probit regression,  $p=0.002$ ). Similarly, when punishment is centralized, cooperation rates are significantly larger under endogenous monitoring (83%) than under exogenous monitoring (67.6%, Probit regression,  $p<0.001$ ). Hence, the possibility to acquire costly information about the actions taken by other group members enhances cooperation independent of the underlying punishment institution.

dummy for the outcome variable. Standard errors are always clustered at the group level.

### *Punishment Errors and Information Acquisition*

To understand the underlying mechanisms for the varying cooperation rates, we next analyze the punishment error rates that are produced in the different social norm enforcement institutions. A Type I error of punishment occurs if a subject who contributed to the public good in period  $t$  receives a positive amount of punishment in period  $t$ . A Type II error of punishment occurs if a subject who did not contribute to the public good in period  $t$  does not receive any punishment in period  $t$ .

**RESULT 3:** *Under private imperfect monitoring, social norm enforcement institutions differ with respect to their relative performance in avoiding Type I and Type II errors of punishment. While decentralization is superior in reducing Type I errors of punishment, centralization is more successful in reducing Type II errors of punishment. However, under decentralized social norm enforcement, Type I errors almost never involve strong sanctions.*

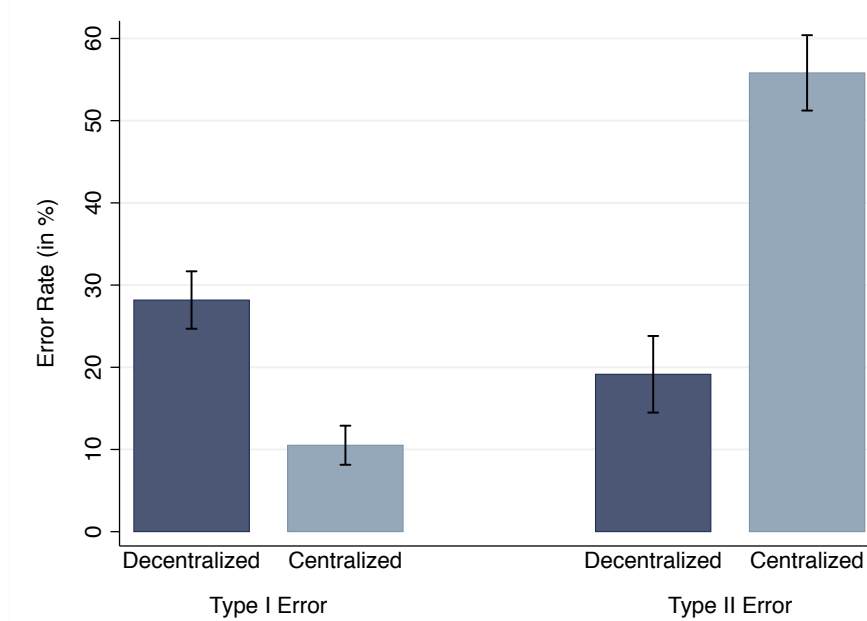


Figure 4.3: Punishment errors under exogenous monitoring

*Note:* This figure shows the fraction of cooperators who received punishment (Type I error) and the fraction of defectors who remained unpunished (Type II error) in the treatments with exogenous monitoring (i.e. treatments EX-DEC and EX-CEN). Error bars denote standard errors.

Figure 4.3 compares Type I and Type II error rates between the centralized and decentralized punishment institutions under exogenous monitoring. The Type I error rate denotes the fraction of cooperators who receive punishment and the Type II error rate denotes the fraction of defectors who remain unpunished. With a Type I error

rate of 28.2%, the decentralized institution produces a significantly larger probability of false positive punishment than the centralized institution, where only 10.5% of cooperators are punished (Probit regression,  $p < 0.001$ ). However, while 55.8% of defectors escape punishment in the centralized institution, only 19.1% of defectors remain unpunished in the decentralized institution (Probit regression,  $p < 0.001$ ). A similar picture emerges under endogenous monitoring (see [Figure 4.4](#)); the probability of a Type I error of punishment increases from 2.5% in the centralized setting to 10.7% in the decentralized punishment institution, but the difference is only significant at the 10%-level (Probit regression,  $p = 0.063$ ). On the other hand, centralization produces a Type II error rate of 43.3%, whereas under decentralization the probability that a defector remains unpunished is only 18.7% (Probit regression,  $p = 0.02$ ). Hence, consistent with our hypothesis, decentralization of social norm enforcement is more prone to Type I errors of punishment than centralization if monitoring is based on private and imperfect information; however, decentralization leads to superior results with respect to a key condition for effective social norm enforcement – the punishment of defectors.<sup>4</sup>

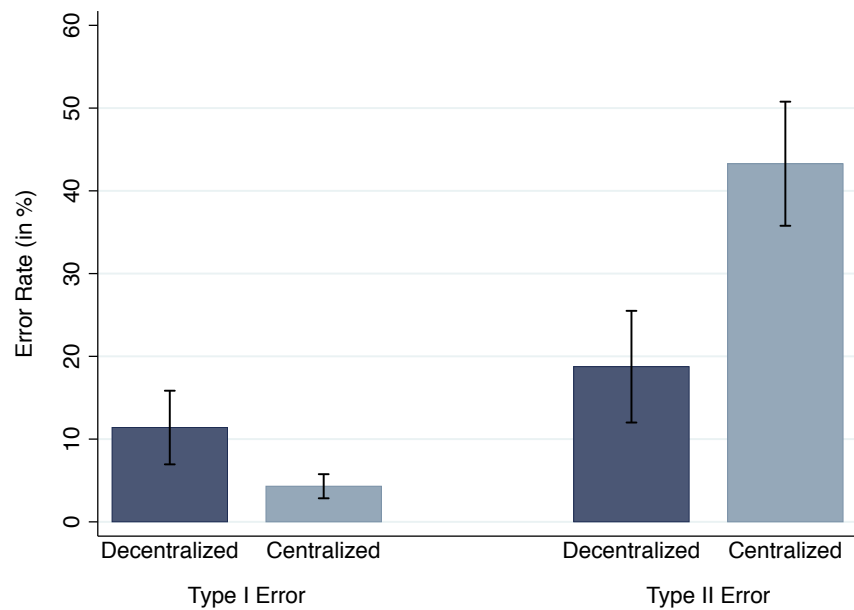


Figure 4.4: Punishment errors under endogenous monitoring

*Note:* This figure shows the fraction of cooperators who received punishment (Type I error) and the fraction of defectors who remained unpunished (Type II error) in the treatments with endogenous monitoring (i.e. treatments END-DEC and END-CEN). Error bars denote standard errors.

<sup>4</sup> In [Appendix C](#) we show that differences in cooperation rates between centralized and decentralized institutions cannot be explained by different reactions to punishment or different punishment decisions given initial signals.

The previous analysis of punishment errors does not discriminate between different punishment levels. In all treatments, there are three levels of punishment that subjects can receive in a given period, leading to a reduction of 8 points, 16 points or 24 points. Table 4.3 provides an overview of the punishment probabilities that defectors and cooperators face in the four treatments, distinguishing two categories of punishment, "low" (8 points) and "high" (16 points or 24 points). Since the probability that more than one peer receives a false signal about a cooperator is relatively low, Type I errors in the decentralized punishment institution consist of almost only the lowest level of punishment, under both exogenous and endogenous monitoring. If social norm enforcement is decentralized, 87% of Type I errors under exogenous monitoring and 93.9% of Type I errors under endogenous monitoring comprise low punishment.

	DEFECTORS			
	EX-DEC	EX-CEN	END-DEC	END-CEN
Low punishment	43.9	18.8	34.8	19.7
High punishment	36.9	25.3	46.4	37.0
Total	80.9	44.2	81.3	56.7

	COOPERATORS			
	EX-DEC	EX-CEN	END-DEC	END-CEN
Low punishment	24.6	3.6	10.7	2.5
High punishment	3.6	7.0	0.7	1.8
Total	28.2	10.5	11.4	4.3

Table 4.3: Overview of punishment rates (in %) by punishment severity

*Note:* This table shows, for each treatment, the fraction (in %) of defectors and the fraction of cooperators who receive punishment, distinguishing between "low" (8 reduction points) and "high" (16 or 24 reduction points) punishment.

**RESULT 4:** *Under endogenous monitoring, substantial demand for additional information about the actions of other group members who appear as defectors significantly reduces Type I errors of punishment in both decentralized and centralized social norm enforcement institutions.*

The probability of a Type I error is significantly lower under endogenous monitoring than under exogenous monitoring, in both decentralized (Probit regression,  $p=0.011$ ) and centralized (Probit regression,  $p=0.022$ ) punishment institutions. However, the possibility to obtain additional information about the contribution decisions of other group members does not reduce the Type II error rate, neither in the decentralized (Probit regression,  $p=0.96$ ) nor in the centralized (Pro-

bit regression,  $p=0.15$ ) punishment institution. Unlike Type II error rates, Type I error rates improve under endogenous monitoring, because subjects focus the acquisition of additional signals on group members who appear as defectors. Figure 4.5 shows the fraction of cases in which a second signal was acquired in the endogenous monitoring treatments, depending on the first signal. While a second signal was acquired in over 50% of the cases in which the first signal stated "Defector", a second signal was acquired in less than 10% of cases in which the first signal stated "Cooperator" (END-DEC: Probit regression,  $p<0.001$ ; END-CEN: Probit regression,  $p<0.001$ ). Signal acquisition behavior does not differ between the decentralized and centralized settings, neither after a first signal "Defector" (Probit regression,  $p=0.676$ ) nor after a first signal "Cooperator" (Probit regression,  $p=0.903$ ). While a third signal was acquired in only 5.9% of the cases in which the first two signals stated "Cooperator", a third signal was acquired in 27% of the cases in which the first two signals stated "Defector" (Probit regression,  $p=0.007$ ). If the first two pieces of information revealed conflicting signals, a third signal was acquired in 36.6% of the cases.

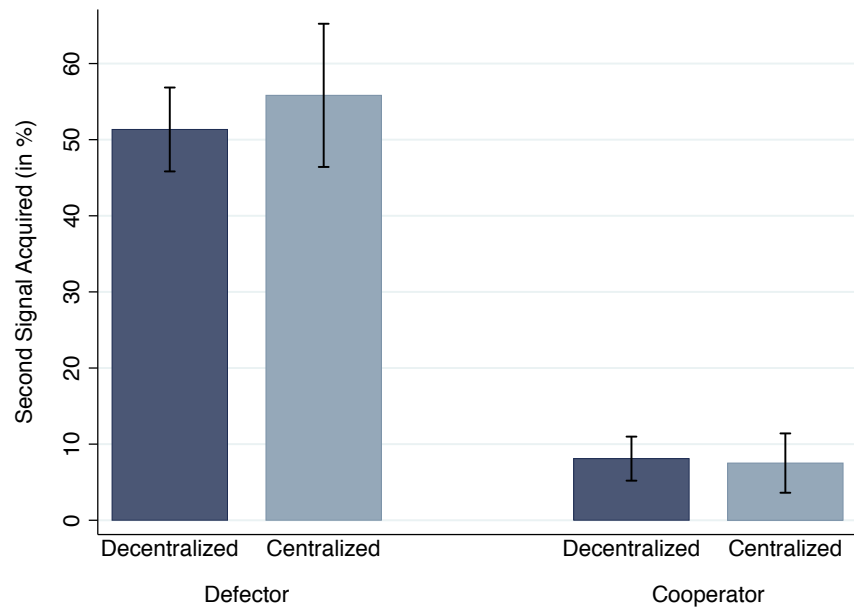


Figure 4.5: Acquisition of second signal depending on first signal

*Note:* This figure shows the fraction of cases in which subjects acquired a second signal in the endogenous monitoring treatments (i.e. END-DEC and END-CEN) depending on the first signal.

#### 4.4 CONCLUSION

In this paper we introduce private imperfect monitoring and information acquisition to public goods games with punishment. By implementing a monitoring technology that provides subjects with private signals about the contribution decisions of other group members, we study the relative performance of different social norm enforcement institutions in resolving social dilemmas under more realistic information environments than those considered in the previous literature. Specifically, we compare a decentralized peer-to-peer punishment institution with a centralized setting, where all punishment power is delegated to a randomly selected authority. Our results show that under private imperfect monitoring decentralization achieves significantly higher cooperation rates than centralization, because defectors are more likely to receive punishment when punishment is decentralized. The two punishment institutions involve a tradeoff between lower Type II punishment error rates (not punishing a defector) in the decentralized setting and lower Type I punishment error rates (punishing a cooperator) in the centralized setting, but the benefits of the lower probability that defectors remain unpunished in the decentralized punishment institution outweigh the disadvantages of the higher likelihood of sanctioning cooperators. Moreover, we find substantial demand for additional signals about the contribution decisions of other group members. In the endogenous monitoring treatments, where subjects can acquire information in addition to the initial signals, subjects are willing to incur costs to improve their information base before exerting punishment. In particular, subjects focus information acquisition on other group members who appear as defectors. By establishing a "standard of proof" before exerting punishment subjects significantly reduce Type I errors of punishment under endogenous monitoring, boosting cooperation rates as compared to an environment where costly information acquisition is not possible. Our results suggest that under private imperfect monitoring centralization of social norm enforcement per se leads to inferior cooperation levels in public goods games as compared to a peer-to-peer punishment environment and that centralization needs to be associated with other performance-enhancing features – such as commitment to punishment rules or election of authorities – to become as effective as peer-to-peer punishment institutions in resolving social dilemmas.





## APPENDIX – DO MARKETS UNDERMINE MORALITY?

### A.1 SESSIONS AND SAMPLE SIZES

Table A.1 provides an overview of all treatments and the respective samples sizes. Six subjects who did not understand the experiment were excluded from the analysis and are not included in Table A.1. Including those subjects does not have any material effect on the results reported in this paper. In the Individual and Individual10 treatments, there were an equal number of active decision makers and passive recipients. Passive recipients could not affect the outcome of the experiment, but were present in the lab.

Treatment	Sessions	Decision Makers	Monopolists	Competitors
<i>Single Period</i>				
Individual	6	97	-	-
Market	3	-	98	-
Market1vs2	5	-	43	86
Market1vs4	4	-	25	100
<i>10 Periods</i>				
Individual10	6	97	-	-
Market10	4	-	106	-
Market10SI	2	-	13	52

Table A.1: Sessions and sample sizes

### A.2 INSTRUCTIONS

In the following section we present English translations of all written instructions used in this study. Subjects were provided with instructions in German.

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## INDIVIDUAL TREATMENT

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

### *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

### *What is this about?*

In this experiment, you will be assigned anonymously to another participant, participant 2. Participant 2 is in the role of a passive participant who can make no decisions and whose payment depends on your decisions. You will see a list of 21 scenarios on your monitor. You must decide for one of two alternatives in each scenario, alternative A or alternative B.

Alternative A is the same in all 21 scenarios: **If alternative A is realized, we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you and participant 2 will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, alternative B is realized, we will not fund the operation for the person suffering from leprosy.** In this case, you and the passive participant will receive a combined additional monetary payment in the amount of CHF 20. The exact distribution of the CHF 20 varies between the individual scenarios.

At the end of the experiment, one scenario will be chosen randomly and your decision from the chosen round will be implemented.

We will explain the consequences of the two alternatives in more detail below.

You have a total of three minutes of time to reach your decisions. After

three minutes have expired, the study will continue with responses to a short questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you select alternative A in the chosen scenario,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you select alternative B in the chosen scenario,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	Your additional payment	Participant 2's additional payment	Consequence for the person suffering from leprosy
Alternative A	CHF 0	CHF 0	Operation will be done
Alternative B	CHF X	20 – CHF X	Operation will <i>not</i> be done

Each of the 21 scenarios only varies with the value of X that applies in Alternative B. X varies between CHF 0 and CHF 20. If, for example, X has the value of CHF 10, you and participant 2 will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done if you select alternative B (= no operation) in the chosen round. In the same way, if X has the value of CHF 15, then you will earn an additional CHF 15 and participant 2 will earn CHF 5 if you selected alternative B (= no operation) in the chosen scenario.

If you select alternative A in the chosen scenario, you and participant 2 will each receive the fix payment of CHF 15, will not earn any additional payment, and the value X plays no role in your payment.

*How you make your decision*

You must decide in each of the 21 scenarios, i.e. for each value of X, whether you select alternative A (= operation for patient suffering from leprosy) or alternative B (= no operation for the patient suffering from leprosy). You will first be asked on the decision monitor how you decide for X = 0. After you have made your decision for X = 0, please make a decision for X = 1, then for X = 2, etc.

- If you always select alternative A (i.e. for all values of X beginning with X = 0), then you must always click on alternative A on the decision monitor.
- If you wish to choose alternative A for smaller values of X and want to change to B for higher values of X, then always click on alternative B beginning at that value of X where you wish to change. **Please note in this case that you cannot switch back from B to A.** This means that if you change from A to B for a certain value of X, then all higher values of X must also remain with alternative B.
- If you always select alternative B (i.e. for all values of X beginning with X = 0), then you must always click on alternative B on the decision monitor.

*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand.

- 1) Assume that  $X = 8$  in the scenario chosen at the end. What happens if you selected alternative B in this scenario? Please mark the correct answer.
  - You and participant 2 each earn a total of CHF 15 (fixed payment) and an operation will be performed on a patient suffering from leprosy.
  - You earn a total of CHF 23 (fixed payment of CHF 15 plus CHF 8), participant 2 earns a total of CHF 27 (fixed payment of CHF 15 plus CHF 12), and an operation will not be performed on a patient suffering from leprosy.
  
- 2) Assume that  $X = 17$  in the scenario chosen at the end. What happens if you selected alternative A in this scenario? Please mark the correct answer.
  - You and participant 2 each earn a total of CHF 15 (fixed payment) and an operation will be performed on a patient suffering from leprosy.
  - You earn a total of CHF 32 (fixed payment of CHF 15 plus CHF 17), participant 2 earns a total of CHF 18 (fixed payment of CHF 15 plus CHF 3), and an operation will not be performed on a patient suffering from leprosy.
  
- 3) Assume that  $X = 0$  in the scenario chosen at the end.
  - How much do you and participant 2 earn in addition to the fixed payment of CHF 15 if you select alternative A (= Operation)?  
Participant 2's additional income: \_\_\_\_ Your additional income: \_\_\_\_
  - How much do you and participant 2 earn in addition to the fixed payment of CHF 15 if you select alternative B (= No operation)?  
Participant 2's additional income: \_\_\_\_ Your additional income: \_\_\_\_
  
- 4) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

## INDIVIDUAL10 TREATMENT

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

### *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

### *What is this about?*

In this experiment, you will be assigned anonymously to another participant, participant 2, in each of ten rounds. After each round, you will be randomly assigned to a **new** participant 2, and you will never be assigned to the same person twice. Participant 2 is in the role of a passive participant who can make no decisions and whose payment depends on your decisions. In each round, you will see a list of 21 scenarios on your monitor; the list is the same in all ten rounds. In each round, you must decide for one of two alternatives in each scenario, alternative A or alternative B.

Alternative A is the same in all 21 scenarios: **If alternative A is realized, we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you and participant 2 will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, alternative B is realized, we will not fund the operation for the person suffering from leprosy.** In this case, you and the passive participant will receive a combined additional monetary payment in the amount of CHF 20. The exact distribution of the CHF 20 varies between the individual scenarios.

After each round, one scenario will be chosen randomly and your decision will be the result of that round. At the end of the experiment, one of the

ten rounds will be chosen randomly and the result of the chosen round will be implemented.

We will explain the consequences of the two alternatives in more detail below.

**You have a total of three minutes of time in each round to make your decisions.** The next round begins after three minutes have expired. The study will continue with responses to a short questionnaire after the tenth round.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you select alternative A in the chosen scenario of the round chosen at the end,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.



If you select alternative B in the chosen scenario of the round chosen at the end, we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	Your additional payment	Participant 2's additional payment	Consequence for the person suffering from leprosy
Alternative A	CHF 0	CHF 0	Operation will be done
Alternative B	CHF X	20 – CHF X	Operation will <i>not</i> be done

Each of the 21 scenarios only varies with the value of X that applies in Alternative B. X varies between CHF 0 and CHF 20. If, for example, X has the value of CHF 10, you and participant 2 will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done if you select alternative B (= no operation) in the chosen scenario of the round chosen at the end. In the same way, if X has the value of CHF 15, then you will earn an additional CHF 15 and participant 2 will earn CHF 5 if you selected alternative B (= no operation) in the chosen scenario of the round chosen at the end.

If you select alternative A in the chosen scenario of the round chosen at the end, you and participant 2 will each receive the fix payment of CHF 15, will not earn any additional payment, and the value X plays no role in your payment.

*How you make your decision*

You must decide in each of the 21 scenarios, i.e. for each value of X, whether you select alternative A (= operation for patient suffering from leprosy) or alternative B (= no operation for the patient suffering from leprosy). You will first be asked on the decision monitor how you decide for X = 0. After you have made your decision for X = 0, please make a decision for X = 1, then for X = 2, etc.

- If you always select alternative A (i.e. for all values of X beginning with X = 0), then you must always click on alternative A on the decision monitor.
- If you wish to choose alternative A for smaller values of X and want to change to B for higher values of X, then always click on alternative B beginning at that value of X where you wish to change. **Please note in this case that you cannot switch back from B to A.** This means that if you change from A to B for a certain value of X, then

all higher values of  $X$  must also remain with alternative B.

- If you always select alternative B (i.e. for all values of  $X$  beginning with  $X = 0$ ), then you must always click on alternative B on the decision monitor.

### *Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand.

- 1) Assume that  $X = 8$  in the chosen scenario of the round chosen at the end. What happens if you selected alternative B in this scenario? Please mark the correct answer.

- You and participant 2 each earn a total of CHF 15 (fixed payment) and an operation will be performed on a patient suffering from leprosy.
- You earn a total of CHF 23 (fixed payment of CHF 15 plus CHF 8), participant 2 earns a total of CHF 27 (fixed payment of CHF 15 plus CHF 12), and an operation will not be performed on a patient suffering from leprosy.

- 2) Assume that  $X = 17$  in the chosen scenario of the round chosen at the end. What happens if you selected alternative A in this scenario? Please mark the correct answer.

- You and participant 2 each earn a total of CHF 15 (fixed payment) and an operation will be performed on a patient suffering from leprosy.
- You earn a total of CHF 32 (fixed payment of CHF 15 plus CHF 17), participant 2 earns a total of CHF 18 (fixed payment of CHF 15 plus CHF 3), and an operation will not be performed on a patient suffering from leprosy.

- 3) Assume that  $X = 0$  in the chosen scenario of the round chosen at the end.

- How much do you and participant 2 earn in addition to the fixed payment of CHF 15 if you select alternative A (= Operation)?

Participant 2's additional income: \_\_\_\_ Your additional income: \_\_\_\_

- How much do you and participant 2 earn in addition to the fixed payment of CHF 15 if you select alternative B (= No operation)?

Participant 2's additional income: \_\_\_\_ Your additional income: \_\_\_\_

- 4) The operation on a leprosy patient has the objective of
- Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

## MARKET TREATMENT

### *Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

### *General Information*

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The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

### *What is this about?*

In this experiment, you will be assigned anonymously to another of this study, participant 2. In a virtual marketplace, you can negotiate with participant 2 about the final distribution of a monetary amount of CHF 20. The negotiations with participant 2 can lead either to an agreement or to no agreement. If you reach an agreement, each of you will receive the amount that you agreed on. If you do not reach an agreement with one of the participants, neither participant receives anything.

### *How the market functions*

You can negotiate with participant 2 for the period of three minutes about the distribution of CHF 20. This means that you can place demands of how much of the CHF 20 you should receive; participant 2 can also make suggestions about how much of the CHF 20 he or she offers to you. You can accept the offer from participant 2, and he or she can accept your demands.

**Once demands and offers have been placed, they can no longer be withdrawn.** When you enter a **new** demand, this must represent an improvement for participant 2, i.e. you must reduce your demand. The same applies for participant 2; if he or she suggests a new offer, this must be an improvement for you; i.e. participant 2 must increase his or her offer.

As soon as you enter a new – reduced – demand, your previous demands

can no longer be accepted. The same applies for offers. As soon as you receive a new offer, you can no longer accept the previous offer. Only the current offers and demands can be accepted.

You make a demand by entering the amount on your monitor that you would like to keep for yourself. If you enter a demand for CHF  $X$ , this means that you would like to retain CHF  $X$  for yourself and that participant 2 will thus receive the amount of CHF  $20 - X$ . This demand will then be notified to participant 2. The same applies for offers. If participant 2 offers you CHF  $Y$ , he or she will enter it on the monitor. An offer of  $Y$  means that you will receive the amount of CHF  $Y$  in case of an agreement, while participant 2 receives CHF  $20 - Y$ .

Demands must be integers between CHF 0 and 20.

The market will be closed when

- a) an agreement is made (i.e. you accept an offer from participant 2, or when participant 2 accepts your demand)
- or
- b) the three minutes have expired.

### Summary of the market

The screenshot shows a market interface with the following components and callouts:

- Top Right:** "Verbleibende Zeit (in Sekunden): 170" (Remaining time in seconds: 170).
- Top Left:** "Ihre aktuelle Forderung" (Your current demand) with a callout: "Your current demand".
- Top Right:** "Aktuelles Angebot von Teilnehmer 2" (Current offer from participant 2) with a callout: "Current offer from participant 2".
- Top Right:** A callout: "The remaining time is shown here" pointing to the timer.
- Middle Left:** "Historie Ihrer Forderungen" (History of your demands) with a callout: "History of your demands".
- Middle Right:** "Historie der Angebote von Teilnehmer 2" (History of participant 2's offers) with a callout: "History of participant 2's offers".
- Bottom Left:** "Meine Forderung in CHF" (My demand in CHF) with a text input field and a callout: "You can enter your demand here and confirm it with the button 'Submit offer'. Only integers between 0 and 20 are possible.".
- Bottom Left:** "Angebot abgeben" (Submit offer) button.
- Bottom Right:** "Aktuelles Angebot von Teilnehmer 2a annehmen" (Accept current offer from participant 2a) button with a callout: "By clicking on this button, you accept participant 2's offer and the market will be closed".

You now have the opportunity to become familiar with the operation of the virtual market for three minutes in a test run. You will be randomly grouped with another participant in the experiment. The test run has no consequences and only has the objective of helping you understand how the virtual market functions.

Please enter the control questions below and raise your hand as soon as you are done.

#### *Control questions*

- 1) Assume that you see the amount of CHF 5 in the window “Current offer from participant 2”. If you click on “Accept current offer from participant 2”, this means that you
  - Accept the distribution “CHF 5 for me and CHF 15 for participant 2”.
  - Accept the distribution “CHF 15 for me and CHF 5 for participant 2”
- 2) After you or participant 2 has accepted an offer,
  - More demands and offers can be made until the three minutes have expired.
  - No further demands and offers can be made because the market is closed.

#### *Continuation of the instructions*

After you were anonymously assigned to participant 2, the market will be open to you once for three minutes. The interaction with participant 2 can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you and participant 2 will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached, we will not fund the operation for the person suffering from leprosy.** In this case, you and participant 2 will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below.

If you do not reach an agreement with participant 2 within the three minute time period, the market will be closed with the result “no agreement”.

We will then fund the operation for a leprosy patient. After expiration of the 3 minutes, the experiment will be continued with a small questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you do not reach an agreement with participant 2 about the division of the additional monetary payment,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you reach an agreement with participant 2 about the division of the additional monetary payment,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant 2	Consequence for the person suffering from leprosy
No agreement	Three minutes elapse without you or participant 2 making or accepting an offer	CHF 0	CHF 0	Operation will be done
Agreement – CHF X for you	You or participant 2 accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2 for CHF 10, you and participant 2 will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2 accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2 will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If both you and participant 2 do not agree to anything, you both will each receive the fix payment of CHF 15, will not earn any additional payment, and the operation will be done for a person suffering from leprosy.



*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse without making a demand or accepting an offer,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2 will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2 will receive no further monetary payments.
  
- 2) If you click on “Accept the current offer from participant 2”,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2 each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2 each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2 will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

## MARKET10 TREATMENT

*[The first part of the instructions in the Market10 treatment is identical to the first part of the instructions in the Market treatment]*

### *Continuation of the instructions*

The market will be open to you for **ten rounds lasting three minutes each**. After three minutes have elapsed, you will be randomly assigned to a **new** participant 2, and you will never be assigned to the same person twice. At the end of the last round, one of the ten rounds will be chosen randomly and the result of the chosen round will be implemented. The interaction with participant 2 can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached in the chosen round, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you and participant 2 will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached in the chosen round, we will not fund the operation for the person suffering from leprosy.** In this case, you and participant 2 will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below.

If you take no action or do not reach an agreement with participant 2 within the three minute time period, the market will be closed with the result “no agreement”. If this round is chosen, we will then fund the operation for a leprosy patient. After expiration of the ten rounds, the experiment will be continued with a small questionnaire.

### *The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you do not reach an agreement with participant 2 about the division of the additional monetary payment,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you reach an agreement with participant 2 about the division of the additional monetary payment,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant 2	Consequence for the person suffering from leprosy
No agreement	Three minutes elapse without you or participant 2 making or accepting an offer	CHF 0	CHF 0	Operation will be done
Agreement – CHF X for you	You or participant 2 accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2 for CHF 10, you and participant 2 will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2 accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2 will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If both you and participant 2 do not agree to anything, you both will each receive the fix payment of CHF 15, will not earn any additional payment, and the operation will be done for a person suffering from leprosy.

*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse in the round chosen at the end without making a demand or accepting an offer,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2 will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2 will receive no further monetary payments.
  
- 2) If you click on “*Accept the current offer from participant 2*” in the round chosen at the end,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2 each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2 each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2 will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

## MARKET1VS2 TREATMENT – INSTRUCTIONS FOR SUBJECTS IN THE ROLE OF COMPETITORS

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

### *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

### *What is this about?*

In this experiment, you will be assigned anonymously to a group with two other participants of this study, participant 2a and participant 2b. In a virtual marketplace, you can negotiate about the final distribution of a monetary amount of CHF 20 with participant 2a. The negotiations with participant 2a can lead either to an agreement or to no agreement. If you reach an agreement with participant 2a, each of you will receive the amount that you agreed on.

At the same time, participant 2a and participant 2b also negotiate about the distribution of CHF 20. Only one agreement can be made, either between participant 2a and you or between participant 2a and participant 2b.

### *How the market functions*

You can negotiate with participant 2a for the period of three minutes about the distribution of CHF 20. This means that you can place demands of how much of the CHF 20 you should receive; participant 2a can also make suggestions about how much of the CHF 20 he or she offers to you. You can accept participant 2a's offers, and he or she can accept your demands.

At the same time, participant 2a and participant 2b are negotiating over the distribution of CHF 20. The offers participant 2a makes apply in exact-

ly the same way for you and for participant 2b. **Both you and participant 2b see participant 2a's offers. The first participant of the two of you to accept participant 2a's offer will receive it. However, you do not see how much participant 2b demands from participant 2a; in the same way, participant 2b does not see how much you demand from participant 2a.** Participant 2a sees both your and participant 2b's demands on his or her screen and can decide, which of the demands he or she would like to accept.

**Once demands and offers have been placed, they can no longer be withdrawn.** This applies for all participants. When you enter a **new** demand, this must represent an improvement for participant 2a, i.e. you must reduce your demand. The same applies for participant 2a; if he or she suggests a new offer, this must be an improvement for you; i.e. participant 2a must increase his or her offer.

As soon as you enter a new – reduced – demand, your previous demands can no longer be accepted. The same applies for offers. As soon as you receive a new offer, you can no longer accept the previous offer. Only the current offers and demands can be accepted.

You make a demand by entering the amount on your monitor that you would like to keep for yourself. If you enter a demand for CHF  $X$ , this means that you would like to retain CHF  $X$  for yourself and that participant 2a will thus receive the amount of CHF  $20 - X$ . This demand will then be notified to participant 2a, but not to participant 2b. The same applies for offers. If participant 2a offers you CHF  $Y$ , he or she will enter it on the monitor. An offer of  $Y$  means that you will receive the amount of CHF  $Y$  in case of an agreement, while participant 2a receives CHF  $20 - Y$ .

Demands must be integers between CHF 0 and 20.

The market will be closed when

- a) an agreement is made (i.e. you or participant 2b accepts an offer from participant 2a or when participant 2a accepts your demand or that of participant 2b)
- or
- b) the three minutes have expired.

### Summary of the market

The screenshot shows a web-based interface for a virtual market experiment. At the top right, a timer indicates 'Verbleibende Zeit (in Sekunden): 170'. The interface is divided into four main sections:

- Top Left (Ihre aktuelle Forderung):** A box labeled 'Your current demand' with a callout pointing to it.
- Top Right (Aktuelles Angebot von Teilnehmer 2a):** A box labeled 'Current offer from participant 2a' with a callout. Next to it is a box labeled 'The remaining time is shown here' with a callout pointing to the timer.
- Bottom Left (Historie Ihrer Forderungen):** A box labeled 'History of your demands' with a callout. Below it is a text input field labeled 'Meine Forderung in CHF' with a callout that says: 'You can enter your demand here and confirm it with the button "Submit offer". Only integers between 0 and 20 are possible'. At the bottom right of this section is a button labeled 'Angebot abgeben'.
- Bottom Right (Historie der Angebote von Teilnehmer 2a):** A box labeled 'History of participant 2a's offers' with a callout. Below it is a button labeled 'Aktuelles Angebot von Teilnehmer 2a annehmen' with a callout that says: 'By clicking on this button, you accept participant 2a's offer and the market will be closed'.

You now have the opportunity to become familiar with the operation of the virtual market for three minutes in a test run. You will be randomly grouped with two other participants in the experiment, a participant 2a and a participant 2b. The test run has no consequences and only has the objective of helping you understand how the virtual market functions.

Please enter the control questions below and raise your hand as soon as you are done.



*Control questions*

- 1) Assume that you see the amount of CHF 5 in the window “Current offer from participant 2a”. If you click on “Accept current offer from participant 2a”, this means that you
  - Accept the distribution “CHF 5 for me and CHF 15 for participant 2a”.
  - Accept the distribution “CHF 15 for me and CHF 5 for participant 2a”
- 2) After you, participant 2a, or participant 2b has accepted an offer,
  - More demands and offers can be made until the three minutes have expired.
  - No further demands and offers can be made because the market is closed.
- 3) Does participant 2b see what your current demand on participant 2a is?
  - Yes
  - No
- 4) If you neither make a demand nor accept an offer
  - none of the three participants receive any further payment.
  - the further payments to participants 2a and 2b depend on how these two participants negotiate with one another.

*Continuation of the instructions*

After you were anonymously assigned to participants 2a and 2b, the market will be open to you once for three minutes. The interaction with participant 2a can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached either between you and participant 2a or between participant 2b and participant 2a, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you, participant 2a, and participant 2b will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached between you and participant 2a or between participant 2b and participant 2a, we will not fund the operation for the person suffering from leprosy.** In this case, you and participant 2a or participant 2b and participant 2a will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below. The other two participants are also completely informed about possible consequences.

If neither you nor participant 2b reaches an agreement with participant 2a within the three minute time period, the market will be closed with the result “no agreement”. We will then fund the operation for a leprosy patient. After expiration of the 3 minutes, the experiment will be continued with a small questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If neither you nor participant 2b reach an agreement with participant 2a about the division of the additional monetary payment,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you either you or participant 2b reaches an agreement about the division of the additional monetary payment,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant 2a	Additional payment for participant 2b	Consequence for the person suffering from leprosy
No agreement	Three minutes elapse without you, participant 2a, and participant 2b accepting an offer	CHF 0	CHF 0	CHF 0	Operation will be done
Agreement with participant 2a – CHF X for you	You or participant 2a accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	CHF 0	Operation will <i>not</i> be done
Agreement between participant 2a and 2b – CHF X for participant 2b	Participant 2a or participant 2b accepts the corresponding offer within the three minutes	CHF 0	CHF 20 – X	CHF X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2a for CHF 10, you and participant 2a will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2a accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2a will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If both you and also participant 2b or 2a do not reach an agreement, all

three participants will each receive the fix payment of CHF 15, will not earn any additional payment, and the operation will be done for a person suffering from leprosy.

### *Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse without making a demand or accepting an offer,
  - A person suffering from leprosy in India will receive an operation, and you, participant 2a, and participant 2b will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you, participant 2a, and participant 2b will receive no further monetary payments.
  - The funding of the operation for a person suffering from leprosy in India depends on how the other two participants act.
  
- 2) If you click on “Accept the current offer from participant 2a”,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2a each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2a each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2a will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

## MARKET1VS2 TREATMENT – INSTRUCTIONS FOR SUBJECTS IN THE ROLE OF MONOPOLISTS

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

### *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

### *What is this about?*

In this experiment, you will be assigned anonymously to a group with two other participants of this study, participant 2a and participant 2b. In a virtual marketplace, you can negotiate about the final distribution of a monetary amount of CHF 20. The negotiations with participants 2a and 2b can lead either to an agreement with one participant or to no agreement. If you reach an agreement with one of the participants, each of you will receive the amount that you agreed on. If you do not reach an agreement with one of the participants, all three participants receive nothing.

You can **only** reach an agreement **with one** of the two other participants. Participant 2a and participant 2b **only** negotiate **with you**, and not with each other. If you reach an agreement with one of the participants, the other will not receive an additional payment.

### *How the market functions*

You can negotiate with participant 2a and participant 2b simultaneously for the period of three minutes about the distribution of CHF 20. This means that you can place demands of how much of the CHF 20 you should receive; participant 2a and participant 2b can also make suggestions about how much of the CHF 20 each of them offers to you. You can accept the offers from participant 2a and 2b, and they can accept your demands.

Your demands apply for both participants 2a and 2b. Both participant 2a and participant 2b see **your demand**. **The first participant to accept your demand will also receive it. However, participant 2a does not see how much participant 2b offers you, and participant 2b does not see how much participant 2a offers you.**

**Once demands and offers have been placed, they can no longer be withdrawn.** This applies for all participants. When you enter a **new** demand, this must represent an improvement for the other participants, i.e. you must reduce your demand. The same applies for participant 2a and participant 2b; if either of them suggests a new offer, this must be an improvement for you; i.e. participant 2a or participant 2b must increase his or her offer.

As soon as you enter a new – reduced – demand, your previous demands can no longer be accepted. The same applies for offers. As soon as you receive a new offer, you can no longer accept the previous offer. Only the current offers and demands can be accepted.

You make a demand by entering the amount on your monitor that you would like to keep for yourself. If you enter a demand for CHF X, this means that you would like to retain CHF X for yourself and that participant 2a or participant 2b will thus receive the amount of CHF 20 – X. This demand will then be notified to participant 2a and to participant 2b. The same applies for offers. If participant 2a or participant 2b offers you CHF Y, he or she will enter it on the monitor. An offer of Y means that you will receive the amount of CHF Y in case of an agreement, while participant 2a or participant 2b receives CHF 20 – Y.

Demands must be integers between CHF 0 and 20.

The market will be closed when

- a) an agreement is made (i.e. you accept an offer from participant 2a or participant 2b, or when participant 2a or participant 2b accepts your demand)
- or
- b) the three minutes have expired.

### Summary of the market

The screenshot shows a web-based interface for a virtual market experiment. At the top right, a red timer indicates 'Verbleibende Zeit (in Sekunden): 119'. The interface is divided into three main columns:

- Left Column (Participant 1):**
  - Top:** 'Ihre aktuelle Forderung' (Your current demand) with a callout 'Your current demand'.
  - Middle:** 'Historie Ihrer Forderungen' (History of your demands) with a callout 'History of your demands'. Below it, a text box explains: 'You can enter your demand here and confirm it with the button "Submit offer". Only integers between 0 and 20 are possible.'
  - Bottom:** 'Meine Forderung in CHF' (My demand in CHF) with a text input field and an 'Angebot abgeben' (Submit offer) button.
- Middle Column (Participant 2a):**
  - Top:** 'Aktuelles Angebot von Teilnehmer 2a' (Current offer from participant 2a) with a callout 'Current offer from participant 2a'.
  - Middle:** 'Historie der Angebote von Teilnehmer 2a' (History of participant 2a's offers) with a callout 'History of participant 2a's offers'.
  - Bottom:** 'Aktuelles Angebot von Teilnehmer 2a annehmen' (Accept current offer from participant 2a) with a callout: 'By clicking on this button, you accept participant 2a's offer and the market will be closed.'
- Right Column (Participant 2b):**
  - Top:** 'Aktuelles Angebot von Teilnehmer 2b' (Current offer from participant 2b) with a callout 'Current offer from participant 2b'.
  - Middle:** 'Historie der Angebote von Teilnehmer 2b' (History of participant 2b's offers) with a callout 'History of participant 2b's offers'.
  - Bottom:** 'Aktuelles Angebot von Teilnehmer 2b annehmen' (Accept current offer from participant 2b) with a callout: 'By clicking on this button, you accept participant 2b's offer and the market will be closed.'

A callout at the top right points to the timer: 'The remaining time is shown here.'

You now have the opportunity to become familiar with the operation of the virtual market for three minutes in a test run. You will be randomly grouped with two other participants in the experiment, a participant 2a and a participant 2b. The test run has no consequences and only has the objective of helping you understand how the virtual market functions.

Please enter the control questions below and raise your hand as soon as you are done.



*Control questions*

- 1) Assume that you see the amount of CHF 5 in the window “Current offer from participant 2a”. If you click on “Accept current offer from participant 2a”, this means that you
  - Accept the distribution “CHF 5 for me and CHF 15 for participant 2a”.
  - Accept the distribution “CHF 15 for me and CHF 5 for participant 2a”
  
- 2) After you, participant 2a, or participant 2b has accepted an offer,
  - More demands and offers can be made until the three minutes have expired.
  - No further demands and offers can be made because the market is closed.
  
- 3) Does participant 2b see what the current, highest offer of participant 2a to you is?
  - Yes
  - No
  
- 4) If you neither make a demand nor accept an offer
  - none of the three participants receive any further payment.
  - the further payments to participants 2a and 2b depend on how these two participants act.

*Continuation of the instructions*

After you were anonymously assigned to participants 2a and 2b, the market will be open to you once for three minutes. The interaction with participant 2a and participant 2b can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you, participant 2a, and participant 2b will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached between you and either participant 2a or participant 2b, we will not fund the operation for the person suffering from leprosy.** In this case, you and participant 2a or participant 2b will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below. The other two participants are also completely informed about possible consequences.

If you do not take any action or do not reach an agreement with participant 2a or participant 2b within the three minute time period, the market will be closed with the result “no agreement”. We will then fund the operation for a leprosy patient. After expiration of the 3 minutes, the experiment will be continued with a small questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you do not reach an agreement with participant 2a or participant 2b about the division of the additional monetary payment,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you reach an agreement with participant 2a or participant 2b about the division of the additional monetary payment,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant 2a	Additional payment for participant 2b	Consequence for the person suffering from leprosy
No agreement	Three minutes elapse without you, participant 2a, and participant 2b accepting an offer	CHF 0	CHF 0	CHF 0	Operation will be done
Agreement with participant 2a – CHF X for you	You or participant 2a accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	CHF 0	Operation will <i>not</i> be done
Agreement with participant 2b – CHF X for participant you	You or participant 2b accepts the corresponding offer within the three minutes	CHF X	CHF 0	CHF 20 – X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2a for CHF 10, you and participant 2a will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2a accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2a will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If both you or the other participants do not reach an agreement, all three participants will each receive the fix payment of CHF 15, will not earn any

additional payment, and the operation will be done for a person suffering from leprosy.

*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse without making a demand or accepting an offer,
  - A person suffering from leprosy in India will receive an operation, and you, participant 2a, and participant 2b will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you, participant 2a, and participant 2b will receive no further monetary payments.
  
- 2) If you click on “*Accept the current offer from participant 2b*”,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2b each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2b each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2b will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

# MARKET1VS4 TREATMENT – INSTRUCTIONS FOR SUBJECTS IN THE ROLE OF COMPETITORS

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

## *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

## *What is this about?*

In this experiment, you will be assigned anonymously to a group with four other participants of this study, participant 2a, participant 2b, participant 2c, and participant 2d. In a virtual marketplace, you can negotiate about the final distribution of a monetary amount of CHF 20 with participant 2a. The negotiations with participant 2a can lead either to an agreement or to no agreement. If you reach an agreement with participant 2a, each of you will receive the amount that you agreed on.

At the same time, participant 2a also negotiates with participant 2b, 2c, and 2d about the distribution of CHF 20. Only one agreement can be made, either between participant 2a and you or between participant 2a and participant 2b, between participant 2a and participant 2c, or between participant 2a and participant 2d.

## *How the market functions*

You can negotiate with participant 2a for the period of three minutes about the distribution of CHF 20. This means that you can place demands of how much of the CHF 20 you should receive; participant 2a can also make suggestions about how much of the CHF 20 he or she offers to you. You can accept participant 2a's offers, and he or she can accept your demands.

At the same time, participant 2a is negotiating with participant 2b, 2c, and 2d over the distribution of CHF 20. The offers participant 2a makes apply in exactly the same way for you and for participant 2b, participant 2c, and participant 2d. **You, participant 2b, participant 2c, and participant 2d see participant 2a's offers. The first participant to accept participant 2a's offer will receive it. However, you do not see how much the other participants demand from participant 2a; in the same way, participants 2b, 2c, and 2d do not see how much the other participants demand from participant 2a.** Participant 2a sees both your demands and those of participants 2b, 2c, and 2d on his or her screen and can decide, which of the demands he or she would like to accept.

**Once demands and offers have been placed, they can no longer be withdrawn.** This applies for all participants. When you enter a **new** demand, this must represent an improvement for participant 2a, i.e. you must reduce your demand. The same applies for participant 2a; if he or she suggests a new offer, this must be an improvement for you; i.e. participant 2a must increase his or her offer.

As soon as you enter a new – reduced – demand, your previous demands can no longer be accepted. The same applies for offers. As soon as you receive a new offer, you can no longer accept the previous offer. Only the current offers and demands can be accepted.

You make a demand by entering the amount on your monitor that you would like to keep for yourself. If you enter a demand for CHF X, this means that you would like to retain CHF X for yourself and that participant 2a will thus receive the amount of CHF 20 – X. This demand will then be notified to participant 2a, but not to participant 2b, 2c, and 2d. The same applies for offers from participant 2a. If participant 2a offers you CHF Y, he or she will enter it on the monitor. An offer of Y means that you will receive the amount of CHF Y in case of an agreement, while participant 2a receives CHF 20 – Y.

Demands must be integers between CHF 0 and 20.

The market will be closed when

- a) an agreement is made (i.e. you or participant 2b, participant 2c, or participant 2d accepts an offer from participant 2a or when participant 2a accepts a demand)

or

- b) the three minutes have expired.

You will not learn until after the period of three minutes has elapsed whether the market was already closed due an agreement was reached between participant 2a and one of the participants 2b, 2c, or 2d.

### Summary of the market

The screenshot shows a web-based interface for a virtual market experiment. It is divided into several sections with callouts explaining their functions:

- Top Right:** A timer labeled "Verbleibende Zeit (in Sekunden): 170".
- Top Left:** A section titled "Ihre aktuelle Forderung" (Your current demand) with a callout: "Your current demand".
- Top Right (Below Timer):** A section titled "Aktuelles Angebot von Teilnehmer 2a" (Current offer from participant 2a) with a callout: "Current offer from participant 2a". Next to it is a callout: "The remaining time is shown here".
- Middle Left:** A section titled "Historie Ihrer Forderungen" (History of your demands) with a callout: "History of your demands". A larger callout box explains: "You can enter your demand here and confirm it with the button 'Submit offer'. Only integers between 0 and 20 are possible".
- Middle Right:** A section titled "Historie der Angebote von Teilnehmer 2a" (History of participant 2a's offers) with a callout: "History of participant 2a's offers". A larger callout box explains: "By clicking on this button, you accept participant 2a's offer and the market will be closed".
- Bottom Left:** A section titled "Meine Forderung in CHF" (My demand in CHF) with a text input field and a callout pointing to it.
- Bottom Center:** A button labeled "Angebot abgeben" (Submit offer).
- Bottom Right:** A button labeled "Aktuelles Angebot von Teilnehmer 2a annehmen" (Accept current offer from participant 2a).

You now have the opportunity to become familiar with the operation of the virtual market for three minutes in a test run. You will be randomly grouped with four other participants in the experiment. The test run has no consequences and only has the objective of helping you understand how the virtual market functions. We will distribute further instructions after the end of the test run.

Please enter the control questions below and raise your hand as soon as you are done.



*Control questions*

- 1) Assume that you see the amount of CHF 5 in the window “Current offer from participant 2a”. If you click on “Accept current offer from participant 2a”, this means that you
  - Accept the distribution “CHF 5 for me and CHF 15 for participant 2a”.
  - Accept the distribution “CHF 15 for me and CHF 5 for participant 2a”
  
- 2) After you have accepted an offer, you can
  - Accept a further offer as long as the three minutes have not yet expired.
  - Not accept another offer, as only one agreement can be made.
  
- 3) Does participant 2b see what your current demand on participant 2a is?
  - Yes
  - No
  
- 4) If you neither make a demand nor accept an offer
  - none of the five participants receives any further payment.
  - the further payments to participants 2a, 2b, 2c, and 2d depend on how these participants negotiate with one another.

*Continuation of the instructions*

After you were anonymously assigned to participants 2a, 2b, 2c, and 2d, the market will be open to you once for three minutes. The interaction with participant 2a can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached either between you and participant 2a or between participant 2a and another participant, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you, participant 2a, participant 2b, participant 2c, and participant 2d will not receive any further monetary payment, meaning that all of you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached between you and participant 2a or between participant 2a and another participant, we will not fund the operation for the person suffering from leprosy.** In this case, you and participant 2a or participant 2a and the other participant will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below. The other three participants are also completely informed about possible consequences.

If neither you nor another participant reaches an agreement with participant 2a within the three minute time period, the market will be closed with the result “no agreement”. We will then fund the operation for a leprosy patient. After expiration of the 3 minutes, the experiment will be continued with a small questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If neither you nor participant 2b, 2c, or 2d reaches an agreement with participant 2a about the division of the additional monetary payment,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you either you or one of the other participants 2b, 2c, or 2d reaches an agreement with participant 2a about the division of the additional monetary payment,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant				Consequence for the person suffering from leprosy
			2a	2b	2c	2d	
No agreement	Three minutes elapse without you, participant 2a, 2b, 2c, 2d accepting an offer	CHF 0	CHF 0	CHF 0	CHF 0	CHF 0	Operation will be done
Agreement with participant 2a – CHF X for you	You or participant 2a accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	CHF 0	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement between participant 2a and 2b – CHF X for participant 2b	Participant 2a or participant 2b accepts the corresponding offer within the three minutes	CHF 0	CHF 20 – X	CHF X	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement between participant 2a and 2c – CHF X for participant 2c	You or participant 2a accepts the corresponding offer within the three minutes	CHF 0	CHF 20 – X	CHF 0	CHF X	CHF 0	Operation will <i>not</i> be done
Agreement between participant 2a and 2d – CHF X for participant 2d	Participant 2a or participant 2b accepts the corresponding offer within the three minutes	CHF 0	CHF 20 – X	CHF 0	CHF 0	CHF X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2a for CHF 10, you and participant 2a will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2a accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2a will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If both you and also participant 2b, 2c, or 2d do not reach an agreement, or if participant 2a does not agree to anything, all five participants will each receive the fix payment of CHF 15, will not earn any additional payment, and the operation will be done for a person suffering from leprosy.

*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse without making a demand or accepting an offer
  - A person suffering from leprosy in India will receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  - The funding of the operation for a person suffering from leprosy in India depends on how the other participants act.
  
- 2) If you click on “*Accept the current offer from participant 2a*” before an agreement between participant 2a and another participant was reached,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2a each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2a each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2a will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

#### MARKET1VS4 TREATMENT – INSTRUCTIONS FOR SUBJECTS IN THE ROLE OF MONOPOLISTS

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

##### *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

##### *What is this about?*

In this experiment, you will be assigned anonymously to a group with four other participants of this study, participant 2a, participant 2b, participant 2c, and participant 2d. In a virtual marketplace, you can negotiate with participants 2a, 2b, 2c, and 2d about the final distribution of a monetary amount of CHF 20. The negotiations can lead either to an agreement with one participant or to no agreement. If you reach an agreement with one of the participants, each of you will receive the amount that you agreed on. If you do not reach an agreement with one of the participants, all five participants receive nothing.

You can **only** reach an agreement **with one** of the four other participants. Participants 2a, 2b, 2c, and 2d **only** negotiate **with you**, and not with each other. If you reach an agreement with one of the participants, the other participants will not receive an additional payment.

##### *How the market functions*

You can negotiate with participants 2a, 2b, 2c, and 2d simultaneously for the period of three minutes about the distribution of CHF 20. This means that you can place demands of how much of the CHF 20 you should receive; participants 2a, 2b, 2c, and 2d can also make suggestions about how much of the CHF 20 each of them offers to you. You can accept the offers from participants 2a, 2b, 2c, and 2d, and they can accept your demands.

Your demands apply for all of the participants 2a, 2b, 2c, and 2d. All participants **see your demand. The first participant to accept your demand will also receive it. However, participants 2a, 2b, 2c, and 2d do not see how much the other participants offer you.** For example, participant 2a does not see how much participant 2b offers you, and participant 2b does not see what participant 2a offers you.

**Once demands and offers have been placed, they can no longer be withdrawn.** This applies for all participants. When you enter a **new** demand, this must represent an improvement for the other participants, i.e. you must reduce your demand. The same applies for participants 2a, 2b, 2c, and 2d; if either of them suggests a new offer, this must be an improvement for you; i.e. participant 2a, 2b, 2c, or 2d must increase his or her offer.

As soon as you enter a new – reduced – demand, your previous demands can no longer be accepted. The same applies for offers. As soon as you receive a new offer, you can no longer accept the previous offer. Only the current offers and demands can be accepted.

You make a demand by entering the amount on your monitor that you would like to keep for yourself. If you enter a demand for CHF  $X$ , this means that you would like to retain CHF  $X$  for yourself and that participants 2a, 2b, 2c, or 2d will thus receive the amount of CHF  $20 - X$ . This demand will then be notified to participants 2a, 2b, 2c, and 2d. The same applies for offers. If participant 2a, 2b, 2c, or 2d offers you CHF  $Y$ , he or she will enter it on the monitor. An offer of  $Y$  means that you will receive the amount of CHF  $Y$  in case of an agreement, while participants 2a, 2b, 2c, or 2d receives CHF  $20 - Y$ .

Demands must be integers between CHF 0 and 20.

The market will be closed when

- a) an agreement is made (i.e. you accept an offer from participants 2a, 2b, 2c, or 2d, or when one of the participants accepts your demand)
- or
- b) the three minutes have expired.

### Summary of the market

The remaining time is shown here.

Verbleibende Zeit (in Sekunden): 110

Ihre aktuelle Forderung	Aktuelles Angebot von 2a	Aktuelles Angebot von 2b	Aktuelles Angebot von 2c	Aktuelles Angebot von 2d
Your current demand	Current offer from participant 2a	Current offer from participant 2b	Current offer from participant 2c	Current offer from participant 2d
Historie Ihrer Forderungen	Historie der Angebote von Teilnehmer 2a	Historie der Angebote von Teilnehmer 2b	Historie der Angebote von Teilnehmer 2c	Historie der Angebote von Teilnehmer 2d
History of your demands	History of participant 2a's offers	History of participant 2b's offers	History of participant 2c's offers	History of participant 2d's offers
	By clicking on this button, you accept participant 2a's offer and the market will be closed.	By clicking on this button, you accept participant 2b's offer and the market will be closed.	By clicking on this button, you accept participant 2c's offer and the market will be closed.	By clicking on this button, you accept participant 2d's offer and the market will be closed.
Meine Forderung in CHF	Angebot von 2a annehmen	Angebot von 2b annehmen	Angebot von 2c annehmen	Angebot von 2d annehmen
Angebot abgeben				

You can enter your demand here and confirm it with the button "Submit offer". Only integers between 0 and 20 are possible.

You now have the opportunity to become familiar with the operation of the virtual market for three minutes in a test run. You will be randomly grouped with four other participants in the experiment. The test run has no consequences and only has the objective of helping you understand how the virtual market functions. We will distribute further instructions after the end of the test run.

Please enter the control questions below and raise your hand as soon as you are done.



*Control questions*

- 1) Assume that you see the amount of CHF 5 in the window “Current offer from participant 2a”. If you click on “Accept current offer from participant 2a”, this means that you
  - Accept the distribution “CHF 5 for me and CHF 15 for participant 2a”.
  - Accept the distribution “CHF 15 for me and CHF 5 for participant 2a”
  
- 2) After you, participant 2a, 2b, 2c, or 2d has accepted an offer,
  - More demands and offers can be made until the three minutes have expired.
  - No further demands and offers can be made because the market is closed.
  
- 3) Does participant 2b see what the current, highest offer of participant 2d to you is?
  - Yes
  - No
  
- 4) If you neither make a demand nor accept an offer
  - none of the three participants receive any further payment.
  - the further payments to participants 2a, 2b, 2c, and 2d depend on how these two participants act.

*Continuation of the instructions*

After you were anonymously assigned to participants 2a, 2b, 2c, and 2d, the market will be open to you once for three minutes. The interaction with participants 2a, 2b, 2c, and 2d can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you, participant 2a, participant 2b, participant 2c, and participant 2d will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached between you and one of the participants 2a, 2b, 2c, or 2d, we will not fund the operation for the person suffering from leprosy.** In this case, you and the participant with whom you reached an agreement will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below. The other four participants are also completely informed about possible consequences.

If you do not take any action or do not reach an agreement with participants 2a, 2b, 2c, or 2d within the three minute time period, the market will be closed with the result “no agreement”. We will then fund the operation for a leprosy patient. After expiration of the 3 minutes, the experiment will be continued with a small questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you do not reach an agreement with one of the participants 2a, 2b, 2c, or 2d about the division of the additional monetary payment,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you reach an agreement with one of the participants 2a, 2b, 2c, or 2d about the division of the additional monetary payment,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant				Consequence for the person suffering from leprosy
			2a	2b	2c	2d	
No agreement	Three minutes elapse without you, participant 2a, 2b, 2c, 2d accepting an offer	CHF 0	CHF 0	CHF 0	CHF 0	CHF 0	Operation will be done
Agreement with participant 2a – CHF X for you	You or participant 2a accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	CHF 0	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement with participant 2b – CHF X for you	You or participant 2b accepts the corresponding offer within the three minutes	CHF X	CHF 0	CHF 20 – X	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement with participant 2c – CHF X for you	You or participant 2c accepts the corresponding offer within the three minutes	CHF X	CHF 0	CHF 0	CHF 20 – X	CHF 0	Operation will <i>not</i> be done
Agreement with participant 2d – CHF X for you	You or participant 2d accepts the corresponding offer within the three minutes	CHF X	CHF 0	CHF 0	CHF 0	CHF 20 – X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2a for CHF 10, you and participant 2a will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2a accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2a will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If both you or the four other participants do not reach an agreement, all five participants will each receive the fix payment of CHF 15, will not earn any additional payment, and the operation will be done for a person suffering from leprosy.

*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse without making a demand or accepting an offer,
  - A person suffering from leprosy in India will receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  
- 2) If you click on “Accept the current offer from participant 2b”,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2b each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2b each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2b will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

### MARKET10SI TREATMENT – INSTRUCTIONS FOR SUBJECTS IN THE ROLE OF COMPETITORS

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

#### *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

#### *What is this about?*

In this experiment, you will be assigned anonymously to a group with four other participants of this study, participant 2a, participant 2b, participant 2c, and participant 2d. In a virtual marketplace, you can negotiate about the final distribution of a monetary amount of CHF 20 **with participant 2a**. The negotiations with participant 2a can lead either to an agreement or to no agreement. If you reach an agreement with participant 2a, each of you will receive the amount that you agreed on.

**At the same time, participant 2a also negotiates with participants 2b, 2c, and 2d about the distribution of CHF 20. Only one agreement can be made**, either between participant 2a and you or between participant 2a and participant 2b, between participant 2a and participant 2c, or between participant 2a and participant 2d.

#### *How the market functions*

You can negotiate with participant 2a for the period of three minutes about the distribution of CHF 20. This means that you can place demands of how much of the CHF 20 you should receive; participant 2a can also make suggestions about how much of the CHF 20 he or she offers to you. You can accept participant 2a's offers, and he or she can accept your demands.

At the same time, participant 2a is negotiating with participants 2b, 2c, and 2d about the distribution of CHF 20. **The offers participant 2a makes apply in exactly the same way for you and for participant 2b, participant 2c, and participant 2d.** All participants see the demands of the other participants on their monitors. **The first participant among you (i.e. you, participant 2b, participant 2c, or participant 2d) to accept an offer from participant 2a will also receive it.** Participant 2a can thus decide whether and which of the demands of the other participants (i.e. you, participant 2b, participant 2c, or participant 2d) he or she would like to accept.

**Once demands and offers have been placed, they can no longer be withdrawn.** This applies for all participants. When you enter a **new** demand, this must represent an improvement for participant 2a, i.e. you must reduce your demand. The same applies for participant 2a; if he or she suggests a new offer, this must be an improvement for you; i.e. participant 2a must increase his or her offer.

As soon as you enter a new – reduced – demand, your previous demands can no longer be accepted. The same applies for offers from participant 2a. As soon as you receive a new offer, you can no longer accept the previous offer. Only the current offers and demands can be accepted.

You make a demand by entering the amount on your monitor that you would like to keep for yourself. If you enter a demand for CHF X, this means that you would like to retain CHF X for yourself and that participant 2a will thus receive the amount of CHF 20 – X. This demand will then be notified to the other participants. The same applies for offers from participant 2a. If participant 2a offers you CHF Y, he or she will enter it on the monitor. An offer of Y means that you will receive the amount of CHF Y in case of an agreement, while participant 2a receives CHF 20 – Y. You, participant 2b, participant 2c, or participant 2d can then accept this offer.

Demands must be integers between CHF 0 and 20.

The market will be closed when

- a) an agreement is made (i.e. you or participant 2b, participant 2c, or participant 2d accepts an offer from participant 2a or when participant 2a accepts a demand)

or

- b) the three minutes have expired.

You will not learn until after the period of three minutes has elapsed whether the market was already closed due an agreement was reached between participant 2a and one of the participants 2b, 2c, or 2d.

### Summary of the market

The screenshot shows a web-based interface for a virtual market experiment. It is divided into several sections with callouts explaining their functions:

- Top Right:** A timer labeled "Verbleibende Zeit (in Sekunden): 170".
- Top Left:** A section titled "Ihre aktuelle Forderung" (Your current demand) with a callout: "Your current demand".
- Top Right (Below Timer):** A section titled "Aktuelles Angebot von Teilnehmer 2a" (Current offer from participant 2a) with a callout: "Current offer from participant 2a". Next to it is a callout: "The remaining time is shown here".
- Middle Left:** A section titled "Historie Ihrer Forderungen" (History of your demands) with a callout: "History of your demands". Below it is a large text box: "You can enter your demand here and confirm it with the button 'Submit offer'. Only integers between 0 and 20 are possible".
- Middle Right:** A section titled "Historie der Angebote von Teilnehmer 2a" (History of participant 2a's offers) with a callout: "History of participant 2a's offers". Below it is a large text box: "By clicking on this button, you accept participant 2a's offer and the market will be closed".
- Bottom Left:** A section titled "Meine Forderung in CHF" (My demand in CHF) with a text input field and a callout pointing to it from the "You can enter your demand..." box. Below the input field is a button labeled "Angebot abgeben" (Submit offer).
- Bottom Right:** A button labeled "Aktuelles Angebot von Teilnehmer 2a annehmen" (Accept current offer from participant 2a) with a callout pointing to it from the "By clicking on this button..." box.

You now have the opportunity to become familiar with the operation of the virtual market for three minutes in a test run. You will be randomly grouped with four other participants in the experiment. The test run has no consequences and only has the objective of helping you understand how the virtual market functions. We will distribute further instructions after the end of the test run.

Please enter the control questions below and raise your hand as soon as you are done.



*Control questions*

- 1) Assume that you see the amount of CHF 5 in the window “Current offer from participant 2a”. If you click on “Accept current offer from participant 2a”, this means that you
  - Accept the distribution “CHF 5 for me and CHF 15 for participant 2a”.
  - Accept the distribution “CHF 15 for me and CHF 5 for participant 2a”
  
- 2) After you have accepted an offer, you can
  - Accept a further offer as long as the three minutes have not yet expired.
  - Not accept another offer, as only one agreement can be made.
  
- 3) Does participant 2b see what your current demand on participant 2a is?
  - Yes
  - No
  
- 4) If you neither make a demand nor accept an offer
  - none of the five participants receives any further payment.
  - the further payments to participants 2a, 2b, 2c, and 2d depend on how these participants negotiate with one another.

*Continuation of the instructions*

The market will be opened for you for **ten rounds lasting three minutes each**. After the three minutes lapse, you will be randomly assigned to a **new** group of participants 2a, 2b, 2c, and 2d. After the last round is completed, one round will be chosen randomly and the results from the chosen round will be realized. The interaction with participant 2a can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached in the chosen round either between you and participant 2a or between participant 2a and another participant, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you, participant 2a, participant 2b, participant 2c, and participant 2d will not receive any further monetary payment, meaning that all of you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached in the chosen round between you and participant 2a or between participant 2a and another participant, we will not fund the operation for the person suffering from leprosy.** In this case, you and participant 2a or participant 2a and the other participant will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below. The other four participants are also completely informed about possible consequences.

If neither you nor another participant reaches an agreement with participant 2a within the three minute time period, the market will be closed with the result “no agreement”. If this round is chosen, we will then fund the operation for a leprosy patient. After completion of the ten rounds, the experiment will be continued with a small questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If neither you nor participant 2b, 2c, or 2d reaches an agreement with participant 2a about the division of the additional monetary payment in the chosen round,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you either you or one of the other participants 2b, 2c, or 2d reaches an agreement with participant 2a about the division of the additional monetary payment in the chosen round,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant				Consequence for the person suffering from leprosy
			2a	2b	2c	2d	
No agreement	Three minutes elapse without you, participant 2a, 2b, 2c, 2d accepting an offer	CHF 0	CHF 0	CHF 0	CHF 0	CHF 0	Operation will be done
Agreement with participant 2a – CHF X for you	You or participant 2a accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	CHF 0	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement between participant 2a and 2b – CHF X for participant 2b	Participant 2a or participant 2b accepts the corresponding offer within the three minutes	CHF 0	CHF 20 – X	CHF X	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement between participant 2a and 2c – CHF X for participant 2c	You or participant 2a accepts the corresponding offer within the three minutes	CHF 0	CHF 20 – X	CHF 0	CHF X	CHF 0	Operation will <i>not</i> be done
Agreement between participant 2a and 2d – CHF X for participant 2d	Participant 2a or participant 2b accepts the corresponding offer within the three minutes	CHF 0	CHF 20 – X	CHF 0	CHF 0	CHF X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2a for CHF 10 in the chosen round, you and participant 2a will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2a accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2a will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If you and also participant 2b, 2c, or 2d do not reach an agreement, or if participant 2a does not agree to anything in the chosen round, all five participants will each receive the fix payment of CHF 15, will not earn any additional payment, and the operation will be done for a person suffering from leprosy.

*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse without making a demand or accepting an offer in the chosen round,
  - A person suffering from leprosy in India will receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  - The funding of the operation for a person suffering from leprosy in India depends on how the other participants act.
  
- 2) If you click on “*Accept the current offer from participant 2a*” in the chosen round before an agreement between participant 2a and another participant was reached,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2a each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2a each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2a will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.

### MARKET10SI TREATMENT – INSTRUCTIONS FOR SUBJECTS IN THE ROLE OF MONOPOLISTS

*Welcome to the Econ-Lab!*

Please read the following instructions carefully. If you have questions, please raise your hand; an assistant will come immediately to you at your desk.

#### *General Information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fix payment of CHF 15 for your participation; you can earn additional monetary amounts depending on how the study runs. You will receive your payment at the end of the study in cash.

Please note that these instructions are only for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of this rule leads to exclusion from the study and all payments.

The data collected in this study will never be associated with your name. Your name will only be used in signing the receipt for your payment, meaning that your anonymity is guaranteed at all times.

#### *What is this about?*

In this experiment, you will be assigned anonymously to a group with four other participants of this study, participant 2a, participant 2b, participant 2c, and participant 2d. In a virtual marketplace, you can negotiate with participants 2a, 2b, 2c, and 2d about the final distribution of a monetary amount of CHF 20. The negotiations can lead either to an agreement with one participant or to no agreement. If you reach an agreement with one of the participants, each of you will receive the amount that you agreed on. If you do not reach an agreement with one of the participants, all five participants receive nothing.

You can **only** reach an agreement **with one** of the four other participants. Participants 2a, 2b, 2c, and 2d **only** negotiate **with you**, and not with each other. If you reach an agreement with one of the participants, the other participants will not receive an additional payment.

#### *How the market functions*

You can negotiate with participants 2a, 2b, 2c, and 2d simultaneously for the period of three minutes about the distribution of CHF 20. This means that you can place demands of how much of the CHF 20 you should receive; participants 2a, 2b, 2c, and 2d can also make suggestions about how much of the CHF 20 each of them offers to you. You can accept the offers from participants 2a, 2b, 2c, and 2d, and they can accept your demands.

All participants can see the demands of the other participants on their monitors. Your demands apply for all of the participants 2a, 2b, 2c, and 2d. **The first participant to accept your demand will also receive it.** You can also choose if and which of the other participants' demands you would like to select.

**Once demands and offers have been placed, they can no longer be withdrawn.** This applies for all participants. When you enter a **new** demand, this must represent an improvement for the other participants, i.e. you must reduce your demand. The same applies for participants 2a, 2b, 2c, and 2d; if either of them suggests a new offer, this must be an improvement for you; i.e. participant 2a, 2b, 2c, or 2d must increase his or her offer.

As soon as you enter a new – reduced – demand, your previous demands can no longer be accepted. The same applies for offers from the other participants. As soon as you receive a new offer, you can no longer accept the previous offer. Only the current offers and demands can be accepted.

You make a demand by entering the amount on your monitor that you would like to keep for yourself. If you enter a demand for CHF X, this means that you would like to retain CHF X for yourself and that participants 2a, 2b, 2c, or 2d will thus receive the amount of CHF  $20 - X$ . This demand will then be notified to participants 2a, 2b, 2c, and 2d. The same applies for offers. If participant 2a, 2b, 2c, or 2d offers you CHF Y, he or she will enter it on the monitor. An offer of Y means that you will receive the amount of CHF Y in case of an agreement, while participants 2a, 2b, 2c, or 2d receives CHF  $20 - Y$ .

Demands must be integers between CHF 0 and 20.

The market will be closed when

- a) an agreement is made (i.e. you accept an offer from participants 2a, 2b, 2c, or 2d, or when one of the participants accepts your demand)
- or
- b) the three minutes have expired.

### Summary of the market

The remaining time is shown here.

Verbleibende Zeit (in Sekunden): 110

Ihre aktuelle Forderung	Aktuelles Angebot von 2a	Aktuelles Angebot von 2b	Aktuelles Angebot von 2c	Aktuelles Angebot von 2d
Your current demand	Current offer from participant 2a	Current offer from participant 2b	Current offer from participant 2c	Current offer from participant 2d
Historie Ihrer Forderungen	Historie der Angebote von Teilnehmer 2a	Historie der Angebote von Teilnehmer 2b	Historie der Angebote von Teilnehmer 2c	Historie der Angebote von Teilnehmer 2d
History of your demands	History of participant 2a's offers	History of participant 2b's offers	History of participant 2c's offers	History of participant 2d's offers
	By clicking on this button, you accept participant 2a's offer and the market will be closed.	By clicking on this button, you accept participant 2b's offer and the market will be closed.	By clicking on this button, you accept participant 2c's offer and the market will be closed.	By clicking on this button, you accept participant 2d's offer and the market will be closed.
Meine Forderung in CHF	Angebot von 2a annehmen	Angebot von 2b annehmen	Angebot von 2c annehmen	Angebot von 2d annehmen
Angebot abgeben				

You can enter your demand here and confirm it with the button "Submit offer". Only integers between 0 and 20 are possible.

You now have the opportunity to become familiar with the operation of the virtual market for three minutes in a test run. You will be randomly grouped with four other participants in the experiment. The test run has no consequences and only has the objective of helping you understand how the virtual market functions. We will distribute additional instructions after conclusion of the test run.

Please enter the control questions below and raise your hand as soon as you are done.



*Control questions*

- 1) Assume that you see the amount of CHF 5 in the window “Current offer from participant 2a”. If you click on “Accept current offer from participant 2a”, this means that you
  - Accept the distribution “CHF 5 for me and CHF 15 for participant 2a”.
  - Accept the distribution “CHF 15 for me and CHF 5 for participant 2a”
  
- 2) After you, participant 2a, 2b, 2c, or 2d has accepted an offer,
  - More demands and offers can be made until the three minutes have expired.
  - No further demands and offers can be made because the market is closed.
  
- 3) Does participant 2b see what the current, highest offer of participant 2d to you is?
  - Yes
  - No
  
- 4) If you neither make a demand nor accept an offer
  - none of the three participants receive any further payment.
  - the further payments to participants 2a, 2b, 2c, and 2d depend on how these two participants act.

*Continuation of the instructions*

The market will be opened for you for **ten rounds lasting three minutes each**. After the three minutes lapse, you will be randomly assigned to a **new** group of participants 2a, 2b, 2c, and 2d. After the last round is completed, one round will be chosen randomly and the results from the chosen round will be realized. The interaction with participant 2a can either lead to an agreement or not lead to an agreement. However, agreement or non-agreement also has consequences for a third party – a patient suffering from leprosy in India.

**If no agreement is reached in the chosen round, then we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you, participant 2a, participant 2b, participant 2c, and participant 2d will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, an agreement is reached in the chosen round between you and one of the participants 2a, 2b, 2c, or 2d, we will not fund the operation for the person suffering from leprosy.** In this case, you and the participant with whom you reached an agreement will receive an additional monetary payment in the amount of the agreed sum.

We will explain the consequences of the two alternatives in more detail below. The other four participants are also completely informed about possible consequences.

If you do not take any action or do not reach an agreement with participants 2a, 2b, 2c, or 2d within the three minute time period, the market will be closed with the result “*no agreement*”. If this round is chosen, we will then fund the operation for a leprosy patient. After completion of the ten rounds, the experiment will be continued with a small questionnaire.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's new leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you do not reach an agreement with one of the participants 2a, 2b, 2c, or 2d about the division of the additional monetary payment in the chosen round,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you reach an agreement with one of the participants 2a, 2b, 2c, or 2d about the division of the additional monetary payment in the chosen round,** we will not provide the funding. This means that if an agreement is reached, the leprosy patient will not receive the operation.

*Summary of possible results*

Result	How is the result reached?	Your additional payment	Additional payment for participant				Consequence for the person suffering from leprosy
			2a	2b	2c	2d	
No agreement	Three minutes elapse without you, participant 2a, 2b, 2c, 2d accepting an offer	CHF 0	CHF 0	CHF 0	CHF 0	CHF 0	Operation will be done
Agreement with participant 2a – CHF X for you	You or participant 2a accepts the corresponding offer within the three minutes	CHF X	CHF 20 – X	CHF 0	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement with participant 2b – CHF X for you	You or participant 2b accepts the corresponding offer within the three minutes	CHF X	CHF 0	CHF 20 – X	CHF 0	CHF 0	Operation will <i>not</i> be done
Agreement with participant 2c – CHF X for you	You or participant 2c accepts the corresponding offer within the three minutes	CHF X	CHF 0	CHF 0	CHF 20 – X	CHF 0	Operation will <i>not</i> be done
Agreement with participant 2d – CHF X for you	You or participant 2d accepts the corresponding offer within the three minutes	CHF X	CHF 0	CHF 0	CHF 0	CHF 20 – X	Operation will <i>not</i> be done

If, for example, you accept an offer from participant 2a for CHF 10 in the chosen round, you and participant 2a will both earn an additional CHF 10, and an operation for a person suffering from leprosy will not be done. In the same way, if participant 2a accepts a demand from you for CHF 15, then you will earn an additional CHF 15 and participant 2a will earn CHF 5; again, an operation for a person suffering from leprosy will not be done.

If you or the four other participants do not reach an agreement in the chosen round, all five participants will each receive the fix payment of CHF 15, will not earn any additional payment, and the operation will be done for a person suffering from leprosy.

*Control questions*

Please now answer the questions below to examine your understanding of the experiment. If you have any questions, please raise your hand. An assistant will come to you at your desk and answer your question. Please mark the correct answer below.

- 1) If you allow the three minutes on the screen to lapse without making a demand or accepting an offer in the chosen round,
  - A person suffering from leprosy in India will receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  - A person suffering from leprosy in India will not receive an operation, and you, participant 2a, participant 2b, participant 2c, and participant 2d will receive no further monetary payments.
  
- 2) If you click on “*Accept the current offer from participant 2b*” in the chosen round,
  - A person suffering from leprosy in India will receive an operation, and you and participant 2b each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2b each receive the agreed upon amount as an additional monetary payment.
  - A person suffering from leprosy in India will not receive an operation, and you and participant 2b will receive no further monetary payments.
  
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy.
  - Strongly relieving the consequences of disfigurement due to leprosy.



## APPENDIX – THE LIMITS TO MORAL EROSION IN MARKETS: SOCIAL NORMS AND THE REPLACEMENT EXCUSE

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### B.1 ADDITIONAL ANALYSES

*Replacement effect is predicted by inequity aversion*

For the take game we provide a formal derivation of our hypothesis, based on the application of the simple outcome-based social preference model by Fehr and Schmidt (1999). The utility function of agent  $i$  is given by

$$U_i(x) = x_i - \alpha_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_j - x_i, 0\} - \beta \frac{1}{n-1} \sum_{j \neq i} \max\{x_i - x_j, 0\}$$

where  $n$  denotes the total number of agents in the reference group,  $\alpha$  represents a disadvantageous inequality aversion parameter, and  $\beta$  represents an advantageous inequality aversion parameter, with restrictions  $\beta \leq \alpha$  and  $0 \leq \beta < 1$ . In condition TG-1, player B1 will prefer “take” if

$$0.9 - 0.8\beta > 0.5$$

and, hence, if  $\beta < 0.5$ . In contrast, in condition TG-1, player B1 will prefer “take” if

$$0.9 - \frac{1}{3}\beta(0.8 + 0.4 + 0.4) > 0.5 - p\left(\frac{1}{3}\alpha \cdot 0.4 + \frac{1}{3}\beta \cdot 0.4\right).$$

Note that the replacement probability  $p$  is determined by the take rates of subsequent players in the chain. Let  $r_2$  and  $r_3$  denote the take rates of player B2 and player B3 respectively; then  $p_{B1} = 1 - (1 - r_2)(1 - r_3)$ . A larger  $\alpha$ , as well as larger replacement probability  $p$ , is associated with a higher propensity to choose “take”. Assuming the lowest possible  $\alpha$ , with  $\alpha = \beta$ , and a replacement probability of  $p = 0.5$ , the condition reduces to  $\beta < 1$ . Hence, even under the most conservative assumptions on the parameter  $\alpha$ , the model predicts that all agents will take when the replacement probability is 50 percent or larger.

*Detailed split of social norms*

We measured social norms in institutions with and without replaceability for the first mover in the respective role. Our results suggest that the appropriateness of an action does not depend on the existence of replaceability. Figure A2 depicts the distribution of norm ratings, split into different degrees of replaceability. For example “Take Game, 3B” shows the distribution of norm ratings for taking the money from the receiver as the first mover in the take game with 3 dictators. Within each game the distributions do not differ.

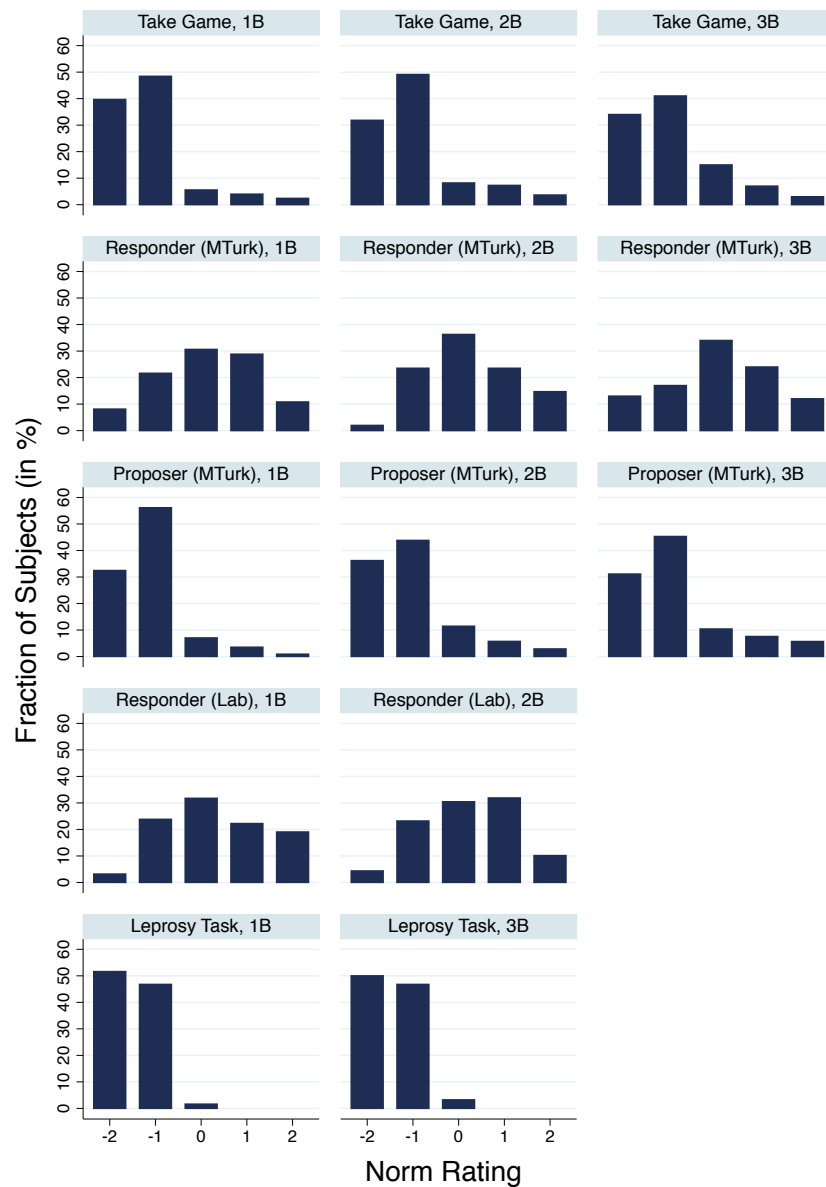


Figure B.1: Social norms across different levels of replaceability



## B.2 INSTRUCTIONS

In the following section we present all instructions used in this study. Subjects in the laboratory were provided with instructions in German. Here we present English translations. Subjects on MTurk were provided with instructions in English.

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## DONATION GAME – BASELINE CONDITION

*Welcome to the Econ Laboratory!*

Please read the instructions below carefully. If you have questions, please raise your hand; a worker will come to your desk in a short time.

### *General information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fixed payment of CHF 15.00 for participating, and, depending on how the study evolves, earn additional monetary amounts. You will receive your payment at the end of the study in cash.

Please note that these instructions are exclusively for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of these rules will result in exclusion from the study and from all payments.

The data collected during the study will never be brought into connection with your identity. Your name will only be used on the receipt for payment, meaning that your anonymity is guaranteed at all times.

### *Experimental procedure*

In this experiment, you have **the opportunity to decide for an additional payment in the amount of CHF 20.**

Taking the money, however, has consequences for a third party – a patient suffering from leprosy in India.

**If you do not take the money, we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, you take the money, we will not fund the operation for the person suffering from leprosy.** In this case, you will receive an additional monetary payment amounting to CHF 20.

We will provide more detailed information about the possible consequences of your actions below.

### *The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-

term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

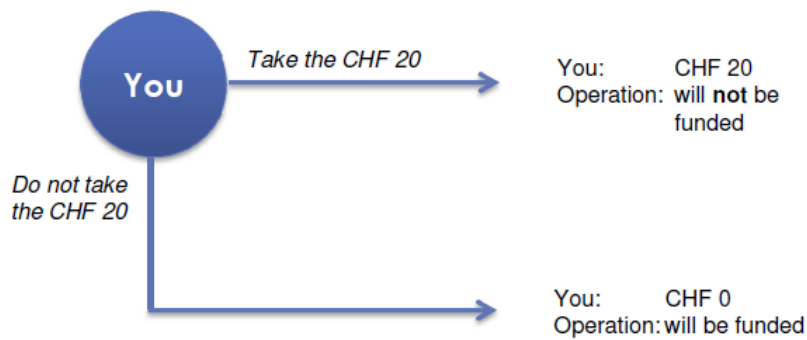
Almost 60% of the world's leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If you do not take the CHF 20,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you take the CHF 20,** we will not provide the funding. This means that the leprosy patient will not receive the operation.

### Summary

The graph below visualizes how your decision determines the possible payments and their consequences for funding the operation.



### Control questions

Please answer the questions below and raise your hand as soon as you are done.

- 1) Assume you take the CHF 20. What is your additional monetary payment, and what are the consequences for the leprosy patient in India?
  - Your additional monetary payment
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India
    - will be funded
    - will not be funded
- 2) Assume you do *not* take the CHF 20. What is your additional monetary payment, and what are the consequences for the leprosy patient in India?
  - Your additional monetary payment
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India

- will be funded
- will not be funded

- 3) The operation on a leprosy patient has the objective of
- Destroying the pathogen that causes leprosy
  - Strongly relieving the consequences of disfigurement due to leprosy.

**DONATION GAME – REPLACEMENT CONDITION (PLAYER 1)**

*Welcome to the Econ Laboratory!*

Please read the instructions below carefully. If you have questions, please raise your hand; a worker will come to your desk in a short time.

*General information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fixed payment of CHF 15.00 for participating, and, depending on how the study evolves, earn additional monetary amounts. You will receive your payment at the end of the study in cash.

Please note that these instructions are exclusively for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of these rules will result in exclusion from the study and from all payments.

The data collected during the study will never be brought into connection with your identity. Your name will only be used on the receipt for payment, meaning that your anonymity is guaranteed at all times.

*Experimental procedure*

In this experiment, you will be randomly grouped with two other participants of the study. Your group consists of participant 1 (P1), participant 2 (P2), and participant 3 (P3). **You are participant 1 (P1).**

**The three participants have the possibility – one after the other – to decide for an additional payment in the amount of CHF 20.** You will be the first to decide if you would like the money or not; after you, P2 will decide, and finally P3.

**However, the money can only be taken by one of the three participants.** P2 can only take the money if you did not take it, and P3 can only take the money if both you and also P2 did not take the money.

Taking the money, however, has consequences for a third party – a patient suffering from leprosy in India.

**If none of the three participants took the money, we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you and the other participants will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, one of the three participants takes the money, we will not**

**fund the operation for the person suffering from leprosy.** In this case, the person taking the money will receive an additional monetary payment amounting to CHF 20.

We will provide more detailed information about the possible consequences of your actions below.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

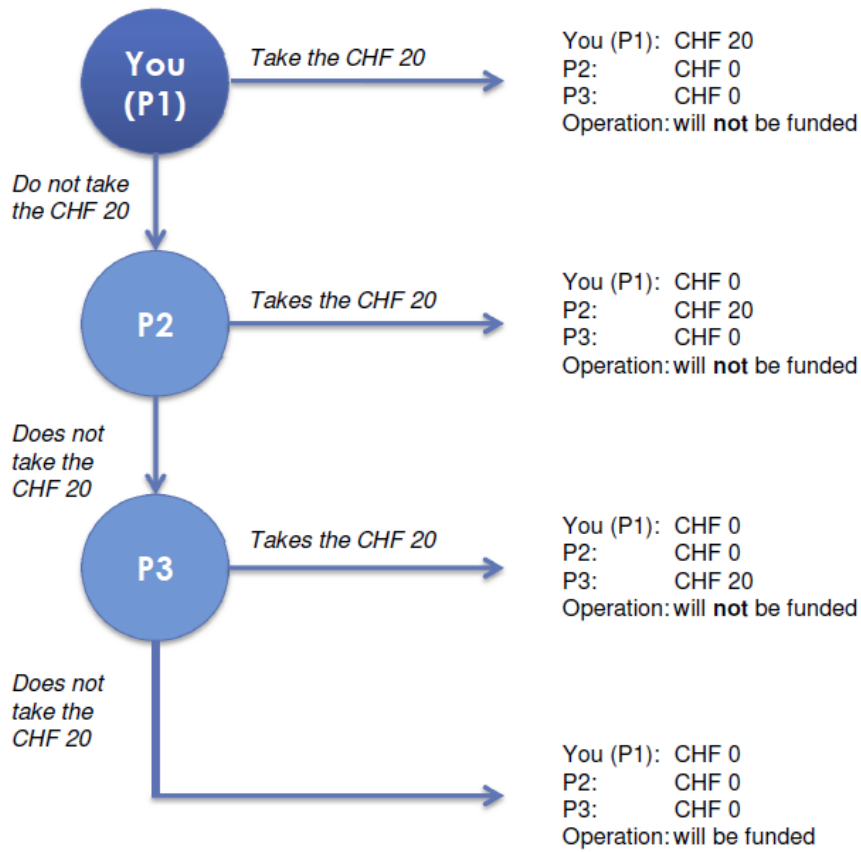
**If you do not take the CHF 20,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If you take the CHF 20,** we will not provide the funding. This means that the leprosy patient will not receive the operation.



### Summary

The graph below visualizes how your decision determines the possible payments and their consequences for funding the operation.



*Control questions*

Please answer the questions below and raise your hand as soon as you are done.

- 1) Assume you take the CHF 20. Can participant 2 also take the CHF 20 in this case?
  - Yes
  - No
  
- 2) Assume you take the CHF 20. What is your additional monetary payment, and what are the consequences for the leprosy patient in India?
  - Your additional monetary payment
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India
    - will be funded
    - will not be funded
    - depends on the decisions of participants 2 and 3
  
- 3) Assume you do *not* take the CHF 20. What is your additional monetary payment, and what are the consequences for the leprosy patient in India?
  - Your additional monetary payment
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India
    - will be funded
    - will not be funded
    - depends on the decisions of participants 2 and 3
  
- 4) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy
  - Strongly relieving the consequences of disfigurement due to leprosy

**DONATION GAME – REPLACEMENT CONDITION (PLAYER 2)**

*Welcome to the Econ Laboratory!*

Please read the instructions below carefully. If you have questions, please raise your hand; a worker will come to your desk in a short time.

*General information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fixed payment of CHF 15.00 for participating, and, depending on how the study evolves, earn additional monetary amounts. You will receive your payment at the end of the study in cash.

Please note that these instructions are exclusively for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of these rules will result in exclusion from the study and from all payments.

The data collected during the study will never be brought into connection with your identity. Your name will only be used on the receipt for payment, meaning that your anonymity is guaranteed at all times.

*Experimental procedure*

In this experiment, you will be randomly grouped with two other participants of the study. Your group consists of participant 1 (P1), participant 2 (P2), and participant 3 (P3). **You are participant 2 (P2).**

**The three participants have the possibility – one after the other – to decide for an additional payment in the amount of CHF 20.** P1 be the first to decide if he would like the money or not; after P1, you will decide, and finally P3.

**However, the money can only be taken by one of the three participants.** You can only take the money if P1 did not take it, and P3 can only take the money if both P1 and also you did not take the money.

Taking the money, however, has consequences for a third party – a patient suffering from leprosy in India.

**If none of the three participants took the money, we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you and the other participants will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, one of the three participants takes the money, we will not**

**fund the operation for the person suffering from leprosy.** In this case, the person taking the money will receive an additional monetary payment amounting to CHF 20.

We will provide more detailed information about the possible consequences of your actions below.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

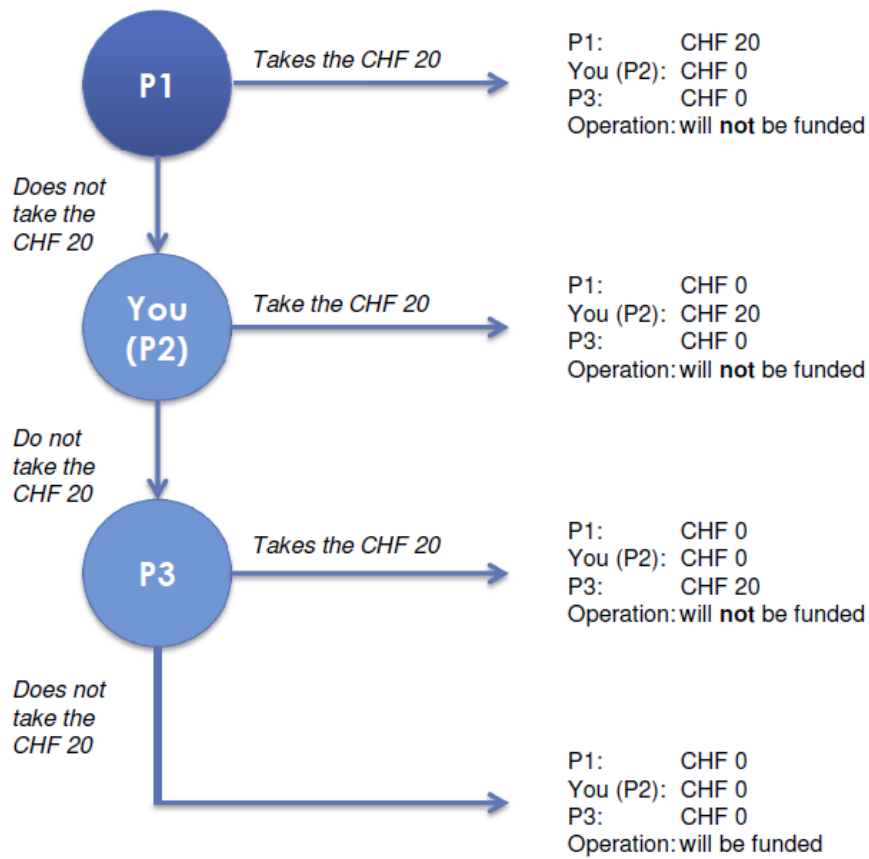
Almost 60% of the world's leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

**If none of the three participants in your group takes the CHF 20,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If one of the three participants in your group takes the CHF 20,** we will not provide the funding. This means that the leprosy patient will not receive the operation.

### Summary

The graph below visualizes how your decision determines the possible payments and their consequences for funding the operation.



*Control questions*

Please answer the questions below and raise your hand as soon as you are done.

1) Assume participant 1 takes the CHF 20. Can you also take the CHF 20 in this case?

- Yes
- No

2) Assume participant 1 takes the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?

- Additional monetary payment of participant 1
  - CHF 0
  - CHF 20
- The operation for the leprosy victim in India
  - will be funded
  - will not be funded
  - depends on the decisions of you and participant 3

3) Assume participant 1 does *not* take the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?

- Additional monetary payment of participant 1
  - CHF 0
  - CHF 20
- The operation for the leprosy victim in India
  - will be funded
  - will not be funded
  - depends on the decisions of you and participant 3

4) The operation on a leprosy patient has the objective of

- Destroying the pathogen that causes leprosy
- Strongly relieving the consequences of disfigurement due to leprosy

**DONATION GAME – REPLACEMENT CONDITION (PLAYER 3)**

*Welcome to the Econ Laboratory!*

Please read the instructions below carefully. If you have questions, please raise your hand; a worker will come to your desk in a short time.

*General information*

You are participating in a study at the Department of Economics at the University of Zurich. You will receive a fixed payment of CHF 15.00 for participating, and, depending on how the study evolves, earn additional monetary amounts. You will receive your payment at the end of the study in cash.

Please note that these instructions are exclusively for your private information, and that communication is absolutely forbidden during the study. If you have questions, please address them to us. Violation of these rules will result in exclusion from the study and from all payments.

The data collected during the study will never be brought into connection with your identity. Your name will only be used on the receipt for payment, meaning that your anonymity is guaranteed at all times.

*Experimental procedure*

In this experiment, you will be randomly grouped with two other participants of the study. Your group consists of participant 1 (P1), participant 2 (P2), and participant 3 (P3). **You are participant 3 (P3).**

**The three participants have the possibility – one after the other – to decide for an additional payment in the amount of CHF 20.** P1 be the first to decide if he would like the money or not; after P1, P2 will decide, and finally you.

**However, the money can only be taken by one of the three participants.** P2 can only take the money if P1 did not take it, and you can only take the money if both P1 and also P2 did not take the money.

Taking the money, however, has consequences for a third party – a patient suffering from leprosy in India.

**If none of the three participants took the money, we will fund a necessary operation for a person suffering from leprosy in India, who otherwise would have no opportunity to have this operation.** In this case, you and the other participants will not receive any further monetary payment, meaning that you will receive your fixed payment of CHF 15 at the end of the study.

**If, however, one of the three participants takes the money, we will not**

**fund the operation for the person suffering from leprosy.** In this case, the person taking the money will receive an additional monetary payment amounting to CHF 20.

We will provide more detailed information about the possible consequences of your actions below.

*The consequences of your actions*

Leprosy is a chronic infectious disease caused by the bacteria *Mycobacterium Leprae*; it is spread from person to person. The pathogen causes death of nerve cells and blockage of arteries and veins. As a result, there is a long-term danger of bodily disfigurement, blindness, or other permanent disabilities.



Although the disease can be cured with medical treatment, many leprosy victims suffer from the consequences of disfigurement from the sickness even after the pathogen has been eradicated. Disfigurement from leprosy leads to a very high degree of ostracism and stigmatization, a situation that victims suffer from for their entire lives. However, even small surgical interventions can significantly reduce the scope of disfigurement.

Almost 60% of the world's leprosy cases occur in India. Due to the prevalence of poverty, funding an operation – which would allow for a life in dignity – is not possible for most of the victims with disfigurement.

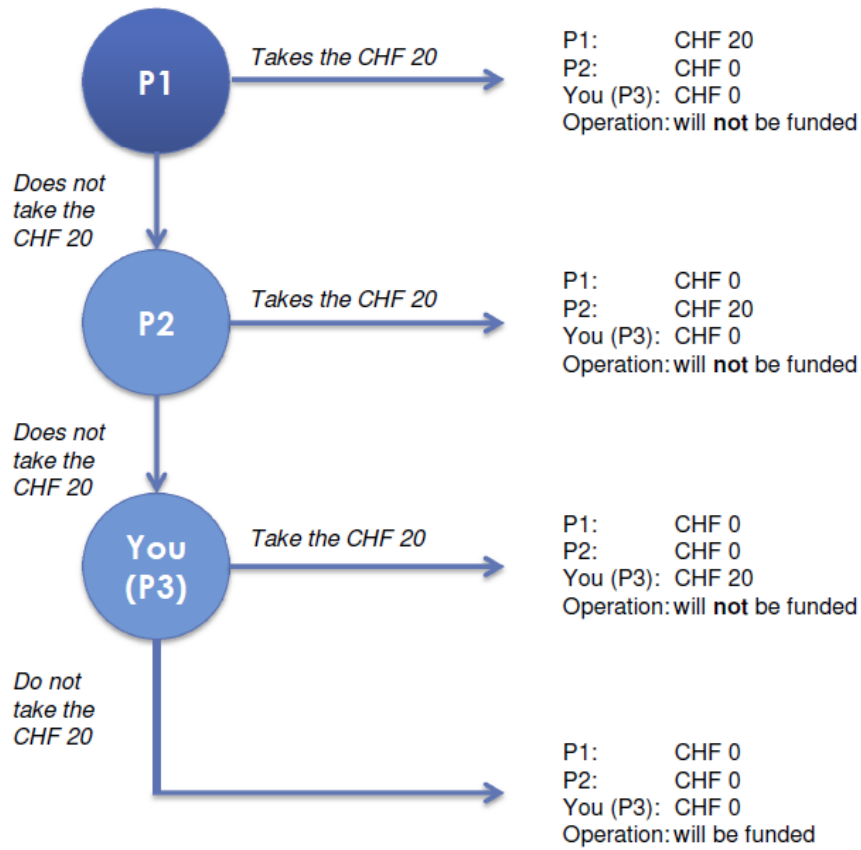
**If none of the three participants in your group takes the CHF 20,** we (the Department of Economics of the University of Zurich in cooperation with the Swiss relief organization FAIRMED) will fund the operation for a victim of leprosy in India. The cost of the operation depends on the extent of disfigurement. A simple procedure in India costs approximately CHF 60; the Department of Economics will cover this amount in full.

**If one of the three participants in your group takes the CHF 20,** we will not provide the funding. This means that the leprosy patient will not receive the operation.



### Summary

The graph below visualizes how your decision determines the possible payments and their consequences for funding the operation.



*Control questions*

Please answer the questions below and raise your hand as soon as you are done.

1) Assume participant 1 takes the CHF 20. Can participant 2 also take the CHF 20 in this case?

- Yes
- No

2) Assume participant 1 takes the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?

- Additional monetary payment of participant 1
  - CHF 0
  - CHF 20
- The operation for the leprosy victim in India
  - will be funded
  - will not be funded
  - depends on the decisions of participant 2 and you

3) Assume participant 1 does *not* take the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?

- Additional monetary payment of participant 1
  - CHF 0
  - CHF 20
- The operation for the leprosy victim in India
  - will be funded
  - will not be funded
  - depends on the decisions of participant 2 and you

4) The operation on a leprosy patient has the objective of

- Destroying the pathogen that causes leprosy
- Strongly relieving the consequences of disfigurement due to leprosy

## DONATION GAME – SOCIAL NORM ELICITATION (BASELINE CONDITION)

Recently we conducted an experimental study in the Econ-Lab. Your task is to evaluate a possible action of a participant in this study and to decide whether taking that action would be "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or "neutral," i.e. neither socially appropriate nor inappropriate. By socially appropriate, we mean behavior that **most people agree** is the "correct" or "ethical" thing to do.

**If you give the same response as that most frequently given by other participants in this experiment, then you will receive an additional CHF 10 as a bonus.**

The rules of the interaction in the recent study were as follows:

--- Original instructions of donation game / baseline condition / player 1---

**Your task is to evaluate the decision of the participant to take away the CHF 20:** If the participant took away the CHF 20, would the participant's action be rated by most people as "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or would it be rated as "neutral," i.e. neither socially appropriate nor inappropriate?

You will have to indicate your belief by choosing one of the following five options:

- very socially inappropriate
- somewhat socially inappropriate
- neutral: neither socially inappropriate nor appropriate
- somewhat socially appropriate
- very socially appropriate

Note that we do not ask you to provide the rating you believe to be "right," but the rating you believe will be the one most frequently chosen by the other participants in this experiment. Therefore, to maximize your chances of receiving the bonus of CHF 10, you should report your best possible guess about the most frequently given response to the question.

*Control questions*

Please answer the questions below and raise your hand as soon as you are done.

Questions about the rules of the recently conducted study:

- 1) Assume the participant takes the CHF 20. What is the participant's additional monetary payment, and what are the consequences for the leprosy patient in India?
  - The participant's additional monetary payment
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India
    - will be funded
    - will not be funded
- 2) Assume the participant does *not* take the CHF 20. What is the participant's additional monetary payment, and what are the consequences for the leprosy patient in India?
  - The participant's additional monetary payment
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India
    - will be funded
    - will not be funded
- 3) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy
  - Strongly relieving the consequences of disfigurement due to leprosy.

Question about your incentive to report your best possible guess about the most frequently given response by other participants:

- 4) If you give the same response as that most frequently given by other participants in this experiment, what will be your bonus payment?

### DONATION GAME – SOCIAL NORM ELICITATION (REPLACEMENT CONDITION)

Recently we conducted an experimental study in the Econ-Lab. Your task is to evaluate a possible action of a participant in this study and to decide whether taking that action would be "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or "neutral," i.e. neither socially appropriate nor inappropriate. By socially appropriate, we mean behavior that **most people agree** is the "correct" or "ethical" thing to do.

**If you give the same response as that most frequently given by other participants in this experiment, then you will receive an additional CHF 10 as a bonus.**

The rules of the interaction in the recent study were as follows:

--- Original instructions of donation game / replacement condition /  
player 1---

**Your task is to evaluate the decision of the participant 1 (P1) to take away the CHF 20:** If participant 1 (P1) took away the CHF 20, would the participant 1's action be rated by most people as "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or would it be rated as "neutral," i.e. neither socially appropriate nor inappropriate?

You will have to indicate your belief by choosing one of the following five options:

- very socially inappropriate
- somewhat socially inappropriate
- neutral: neither socially inappropriate nor appropriate
- somewhat socially appropriate
- very socially appropriate

Note that we do not ask you to provide the rating you believe to be "right," but the rating you believe will be the one most frequently chosen by the other participants in this experiment. Therefore, to maximize your chances of receiving the bonus of CHF 10, you should report your best possible guess about the most frequently given response to the question.

*Control questions*

Please answer the questions below and raise your hand as soon as you are done.

Questions about the rules of the recently conducted study:

1) Assume participant 1 takes the CHF 20. Can participant 2 also take the CHF 20 in this case?

- Yes
- No

2) Assume participant 1 takes the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?

- Additional monetary payment of participant 1
  - CHF 0
  - CHF 20
- The operation for the leprosy victim in India
  - will be funded
  - will not be funded
  - depends on the decisions of participants 2 and 3

3) Assume participant 1 does *not* take the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?

- Additional monetary payment of participant 1
  - CHF 0
  - CHF 20
- The operation for the leprosy victim in India
  - will be funded
  - will not be funded
  - depends on the decisions of participants 2 and 3

4) The operation on a leprosy patient has the objective of

- Destroying the pathogen that causes leprosy
- Strongly relieving the consequences of disfigurement due to leprosy.

Question about your incentive to report your best possible guess about the most frequently given response by other participants:

- 5) If you give the same response as that most frequently given by other participants in this experiment, what will be your bonus payment?

**DONATION GAME – BELIEF ELICITATION**

Recently we conducted an experimental study in the Econ-Lab. Your task is to make an estimate about the actual behavior of participants in this study. The rules of the interaction were as follows:

---Original instructions donation game / replacement condition / player 1---

Your task is to guess the behavior of participants 2 and 3 (P2 and P3) in the cases in which P1 did not take the CHF 20.

**What do you think: in what percent (%) of the cases in which P1 did not take the CHF20 was the money taken either by P2 or, if not by player P2, then finally by P3?**

You will have to type in a guess between 0% - 100%. You will earn a bonus of CHF 10, if your estimate is not further than 5%-points away from the true value.

Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess.



*Control questions*

Please answer the questions below and raise your hand as soon as you are done.

Questions about the rules of the recently conducted study:

- 1) Assume participant 1 takes the CHF 20. Can participant 2 also take the CHF 20 in this case?
  - Yes
  - No
  
- 2) Assume participant 1 takes the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?
  - Additional monetary payment of participant 1
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India
    - will be funded
    - will not be funded
    - depends on the decisions of participants 2 and 3
  
- 3) Assume participant 1 does *not* take the CHF 20. What is the additional monetary payment of participant 1, and what are the consequences for the leprosy patient in India?
  - Additional monetary payment of participant 1
    - CHF 0
    - CHF 20
  - The operation for the leprosy victim in India
    - will be funded
    - will not be funded
    - depends on the decisions of participants 2 and 3
  
- 4) The operation on a leprosy patient has the objective of
  - Destroying the pathogen that causes leprosy
  - Strongly relieving the consequences of disfigurement due to leprosy.

Question about your incentive to report your best possible guess:

- 5) If your guess for the randomly selected question is sufficiently close to the true value (not further away than 5%-points), what will be your bonus payment?

**TAKE GAME WITHOUT PUNISHMENT (TG-1)***Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

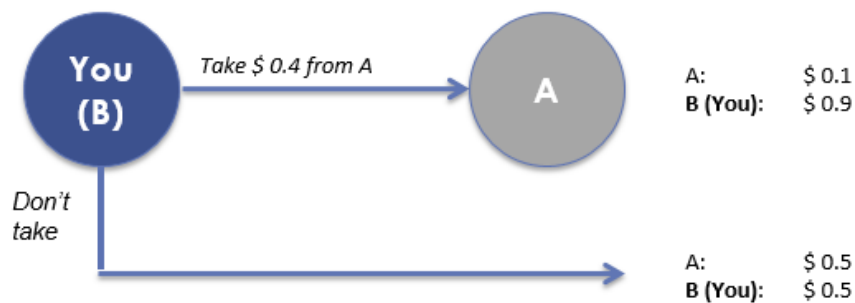
*Instructions*

You are participating in a study with another participant, also recruited via Amazon Mechanical Turk. There are players A and B. Both players start with an endowment of \$ 0.5 each. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.) You are player [insert role here].

The player B has the option to take away \$ 0.4 from A.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participant.

Figure provided to player B (figures provided to other participant analogous):



*Control Questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B:**

1. Suppose you do not take away \$ 0.4 from A. What will be your bonus payment?

Your bonus payment: \_\_\_\_

2. Suppose you take away \$ 0.4 from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**A:**

1. Suppose B1 does not take away \$ 0.4 from you. What will be your bonus payment?

Your bonus payment : \_\_\_\_

2. Suppose B1 takes away \$ 0.4 from you. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_

B1's bonus payment : \_\_\_\_

**TAKE GAME WITHOUT PUNISHMENT (TG-2)***Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

*Instructions*

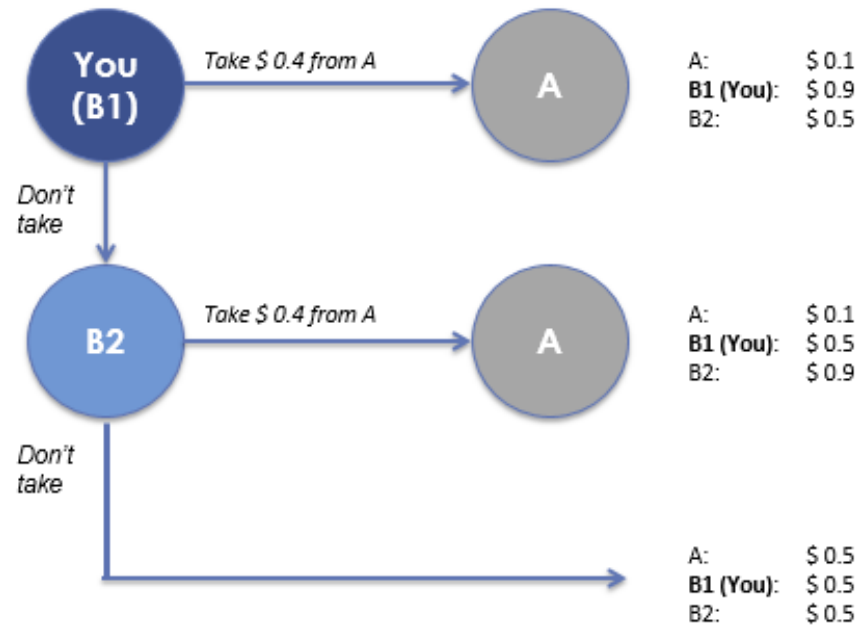
You are participating in a study with two other participants, also recruited via Amazon Mechanical Turk. There are players A, B1 and B2. All three players start with an endowment of \$ 0.5 each. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.) You are player [insert role here].

The two players B have the option—one after the other—to take away \$ 0.4 from A. First, B1 decides whether or not to take away the money and then B2 decides.

However, A can be taken away the \$ 0.4 only once. B2 thus can take away the money only if B1 did not take it.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participants.

Figure provided to player B1 (figures provided to other participants analogous):



*Control Questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B1:**

1. Suppose you take away \$ 0.4 from A. Can B2 take away \$ 0.4 from A in this case?

\_\_\_Yes                  \_\_\_No

2. Suppose you do not take away \$ 0.4 from A. What will be your bonus payment?

Your bonus payment: \_\_\_

3. Suppose you take away \$ 0.4 from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**B2:**

1. Suppose B1 takes away \$ 0.4 from A. Can you take away \$ 0.4 from A in this case?

\_\_\_Yes                  \_\_\_No

2. Suppose B1 does not take away \$ 0.4 from A and you do not take away \$ 0.4 from A either. What will be your bonus payment?

Your bonus payment : \_\_\_

3. Suppose B1 does not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**A:**

1. Suppose B1 takes away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?  
\_\_\_\_Yes                      \_\_\_\_No
2. Suppose B1 does not take away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?  
\_\_\_\_Yes                      \_\_\_\_No
3. Suppose B1 and B2 do not take away \$ 0.4 from you. What will be your bonus payment?  
Your bonus payment : \_\_\_\_
4. Suppose B1 takes away \$ 0.4 from you. What will be your bonus payment and what will be B1's bonus payment?  
Your bonus payment : \_\_\_\_  
B1's bonus payment : \_\_\_\_



**TAKE GAME WITHOUT PUNISHMENT (TG-3)***Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

*Instructions*

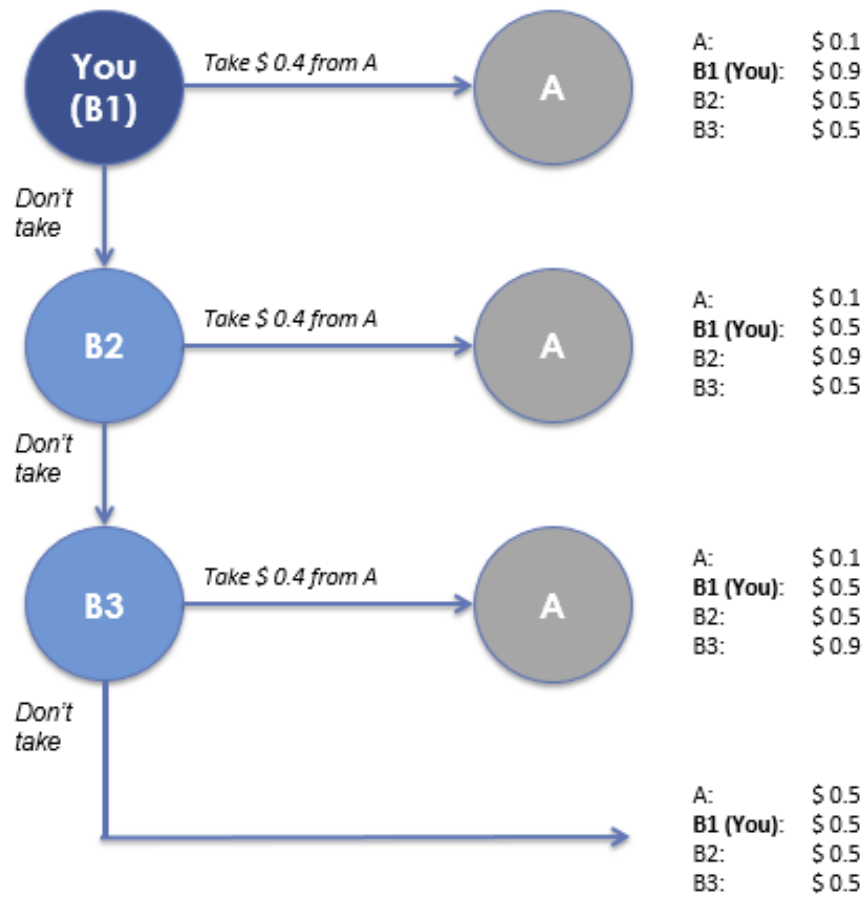
You are participating in a study with three other participants, also recruited via Amazon Mechanical Turk. There are players A, B1, B2 and B3. All four players start with an endowment of \$ 0.5 each. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.) You are player [insert role here].

The three players B have the option—one after the other—to take away \$ 0.4 from A. First, B1 decides whether or not to take away the money, then B2 decides and finally B3.

However, A can be taken away the \$ 0.4 only once. B2 thus can take away the money only if B1 did not take it, and B3 can take the money only if both B1 and B2 did not take it.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participants.

Figure provided to player B1 (figures provided to other participants analogous):



*Control Questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B1:**

1. Suppose you take away \$ 0.4 from A. Can B2 take away \$ 0.4 from A in this case?

\_\_\_Yes      \_\_\_No

2. Suppose you do not take away \$ 0.4 from A. What will be your bonus payment?

Your bonus payment: \_\_\_

3. Suppose you take away \$ 0.4 from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**B2:**

1. Suppose B1 does not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. Can B3 take away \$ 0.4 from A in this case?

\_\_\_Yes      \_\_\_No

2. Suppose B1 takes away \$ 0.4 from A. Can you take away \$ 0.4 from A in this case?

\_\_\_Yes      \_\_\_No

3. Suppose B1 does not take away \$ 0.4 from A and you do not take away \$ 0.4 from A either. What will be your bonus payment?

Your bonus payment : \_\_\_

4. Suppose B1 does not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**B3:**

1. Suppose B1 takes away \$ 0.4 from A. Can you take away \$ 0.4 from A in this case?

\_\_\_\_Yes                  \_\_\_\_No

2. Suppose B1 and B2 do not take away \$ 0.4 from A and you do not take away \$ 0.4 from A either. What will be your bonus payment?

Your bonus payment : \_\_\_\_

3. Suppose B1 and B2 do not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**A:**

1. Suppose B1 takes away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?

\_\_\_\_Yes                  \_\_\_\_No

2. Suppose B1 does not take away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?

\_\_\_\_Yes                  \_\_\_\_No

3. Suppose B1, B2 and B3 do not take away \$ 0.4 from you. What will be your bonus payment?

Your bonus payment : \_\_\_\_

4. Suppose B1 takes away \$ 0.4 from you. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_\_

B1's bonus payment : \_\_\_\_\_

## TAKE GAME WITH PUNISHMENT (TGWP-1)

### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

### *Instructions*

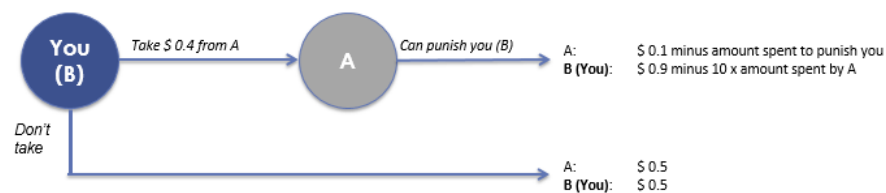
You are participating in a study with another participants, also recruited via Amazon Mechanical Turk. There are players A and B. Both players start with an endowment of \$ 0.5 each. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.) You are player [insert role here].

Player B has the option to take away \$ 0.4 from A.

Finally, if B took away the \$ 0.4 from A, then A can spend up to \$ 0.05 of his or her own money to punish B. For each \$ 0.01 spent by A, the payoff of B who took away the money will decrease by \$ 0.1.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participant.

Figure provided to player B (figures provided to other participant analogous):



*Control questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B1:**

1. Suppose you do not take away \$ 0.4 from A. What will be your bonus payment?

Your bonus payment: \_\_\_\_

2. Suppose you take away \$ 0.4 from A, and A spends \$ 0.05 to punish you. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**A:**

1. Suppose B1 does not take away \$ 0.4 from you. What will be your bonus payment?

Your bonus payment : \_\_\_\_

2. Suppose B1 takes away \$ 0.4 from you, and you spend \$ 0.05 to punish B1. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_

B1's bonus payment : \_\_\_\_

**TAKE GAME WITH PUNISHMENT (TGWP-2)***Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

*Instructions*

You are participating in a study with two other participants, also recruited via Amazon Mechanical Turk. There are players A, B1, and B2. All three players start with an endowment of \$ 0.5 each. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.) You are player [insert role here].

The two players B have the option—one after the other—to take away \$ 0.4 from A. First, B1 decides whether or not to take away the money and then B2 decides.

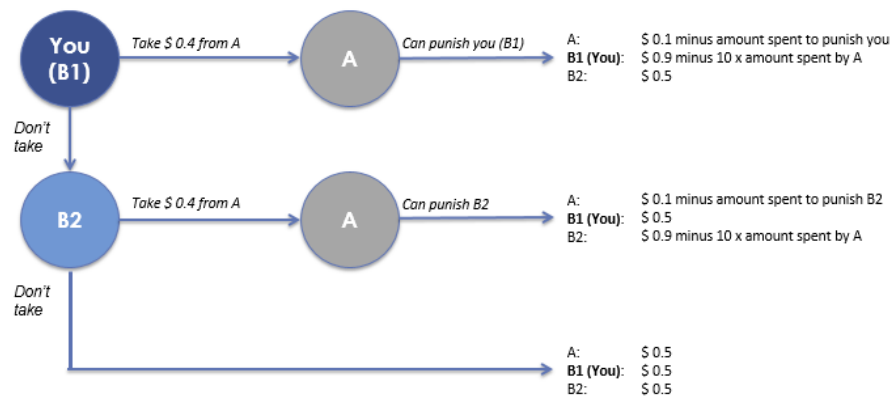
However, A can be taken away the \$ 0.4 only once. B2 thus can take away the money only if B1 did not take it.

Finally, if one of the players B took away the \$ 0.4 from A, then A can spend up to \$ 0.05 of his or her own money to punish the player B who took away the money. For each \$ 0.01 spent by A, the payoff of the player B who took away the money will decrease by \$ 0.1.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participants.



Figure provided to player B1 (figures provided to other participants analogous):



### Control questions

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

#### B1:

- Suppose you take away \$ 0.4 from A. Can B2 take away \$ 0.4 from A in this case?

\_\_\_Yes      \_\_\_No

- Suppose you do not take away \$ 0.4 from A. What will be your bonus payment?

Your bonus payment: \_\_\_

- Suppose you take away \$ 0.4 from A, and A spends \$ 0.05 to punish you. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_

A's bonus payment: \_\_\_

**B2:**

1. Suppose B1 takes away \$ 0.4 from A. Can you take away \$ 0.4 from A in this case?  
☐ Yes                      ☐ No
  
2. Suppose B1 does not take away \$ 0.4 from A and you do not take away \$ 0.4 from A either. What will be your bonus payment?  
 Your bonus payment :
  
3. Suppose B1 does not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. Suppose A spends \$ 0.05 to punish you. What will be your bonus payment, and what will be A's bonus payment?  
 Your bonus payment :   
 A's bonus payment :

**A:**

1. Suppose B1 takes away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?  
☐ Yes                      ☐ No
  
2. Suppose B1 does not take away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?  
☐ Yes                      ☐ No
  
3. Suppose B1 and B2 do not take away \$ 0.4 from you. What will be your bonus payment?  
 Your bonus payment :
  
4. Suppose B1 takes away \$ 0.4 from you, and you spend \$ 0.05 to punish B1. What will be your bonus payment and what will be B1's bonus payment?  
 Your bonus payment :   
 B1's bonus payment :

**TAKE GAME WITH PUNISHMENT (TGWP-3)***Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

*Instructions*

You are participating in a study with three other participants, also recruited via Amazon Mechanical Turk. There are players A, B1, B2 and B3. All four players start with an endowment of \$ 0.5 each. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.) You are player [insert role here].

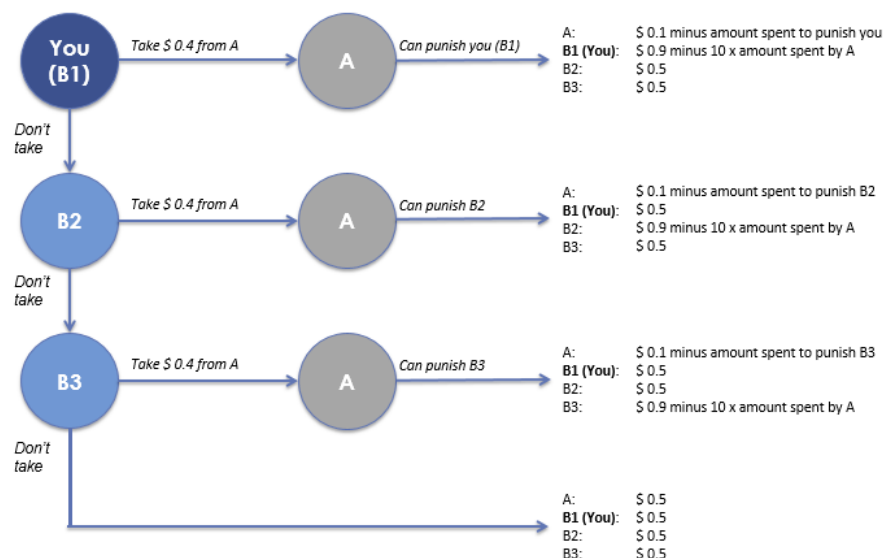
The three players B have the option—one after the other—to take away \$ 0.4 from A. First, B1 decides whether or not to take away the money, then B2 decides and finally B3.

However, A can be taken away the \$ 0.4 only once. B2 thus can take away the money only if B1 did not take it, and B3 can take the money only if both B1 and B2 did not take it.

Finally, if one of the players B took away the \$ 0.4 from A, then A can spend up to \$ 0.05 of his or her own money to punish the player B who took away the money. For each \$ 0.01 spent by A, the payoff of the player B who took away the money will decrease by \$ 0.1.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participants.

Figure provided to player B1 (figures provided to other participants analogous):



### Control questions

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

### B1:

- Suppose you take away \$ 0.4 from A. Can B2 take away \$ 0.4 from A in this case?

\_\_\_Yes      \_\_\_No

- Suppose you do not take away \$ 0.4 from A. What will be your bonus payment?

Your bonus payment: \_\_\_

3. Suppose you take away \$ 0.4 from A, and A spends \$ 0.05 to punish you. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**B2:**

1. Suppose B1 does not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. Can B3 take away \$ 0.4 from A in this case?

\_\_\_Yes                  \_\_\_No

2. Suppose B1 takes away \$ 0.4 from A. Can you take away \$ 0.4 from A in this case?

\_\_\_Yes                  \_\_\_No

3. Suppose B1 does not take away \$ 0.4 from A and you do not take away \$ 0.4 from A either. What will be your bonus payment?

Your bonus payment : \_\_\_\_

4. Suppose B1 does not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. Suppose A spends \$ 0.05 to punish you. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**B3:**

1. Suppose B1 takes away \$ 0.4 from A. Can you take away \$ 0.4 from A in this case?

\_\_\_Yes                  \_\_\_No

2. Suppose B1 and B2 do not take away \$ 0.4 from A and you do not take away \$ 0.4 from A either. What will be your bonus payment?

Your bonus payment : \_\_\_\_

3. Suppose B1 and B2 do not take away \$ 0.4 from A. It is thus your move and suppose you decide to take away \$ 0.4 from A. Suppose A spends \$ 0.05 to punish you. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**A:**

1. Suppose B1 takes away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?

\_\_\_\_Yes              \_\_\_\_No

2. Suppose B1 does not take away \$ 0.4 from you. Can B2 take away \$ 0.4 from you in this case?

\_\_\_\_Yes              \_\_\_\_No

3. Suppose B1, B2 and B3 do not take away \$ 0.4 from you. What will be your bonus payment?

Your bonus payment : \_\_\_\_

4. Suppose B1 takes away \$ 0.4 from you, and you spend \$ 0.05 to punish B1. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_

B1's bonus payment : \_\_\_\_

## TAKE GAME – SOCIAL NORM ELICITATION (TG-1)

### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click "OK" we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

### *Instructions*

Recently we conducted an interactive study on Amazon Mechanical Turk. Your task is to evaluate a possible action of a participant in this study and to decide whether taking that action would be "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or "neutral," i.e. neither socially appropriate nor inappropriate. By socially appropriate, we mean behavior that **most people agree** is the "correct" or "ethical" thing to do.

**If you give the same response as that most frequently given by other participants in this experiment, then you will receive an additional \$ 3 as a bonus.**

The rules of the interaction in the recent study were as follows:

--- Original instructions of Take Game (TG-1) / player B---

**Your task is to evaluate player B's decision to take away the \$ 0.4 from A:**

If B took away the \$ 0.4 from A, would B's action be rated by most people as "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or would it be rated as "neutral," i.e. neither socially appropriate nor inappropriate?

You will have to indicate your belief by choosing one of the following five options:

- very socially inappropriate
- somewhat socially inappropriate
- neutral: neither socially inappropriate nor appropriate
- somewhat socially appropriate
- very socially appropriate

Note that we do not ask you to provide the rating you believe to be “right,” but the rating you believe will be the one most frequently chosen by the other participants in this experiment. Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess about the most frequently given response to the question.

#### *Control Questions*

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

Please answer the following questions about the rules of the interaction:

1. Suppose B does not take away \$ 0.4 from A. What will be B’s bonus payment?

B’s bonus payment: \_\_\_\_\_

2. Suppose B takes away \$ 0.4 from A. What will be B’s bonus payment, and what will be A’s bonus payment?

B’s bonus payment: \_\_\_\_\_

A’s bonus payment: \_\_\_\_\_

Please answer the following question about your incentives to report your best possible guess about the most frequently given response by other participants:

3. If you give the same response as that most frequently given by other participants in this experiment, what will be your bonus payment?



## TAKE GAME – SOCIAL NORM ELICITATION (TG-2 / TG-3)

### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click "OK" we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

### *Instructions*

Recently we conducted an interactive study on Amazon Mechanical Turk. Your task is to evaluate a possible action of a participant in this study and to decide whether taking that action would be "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or "neutral," i.e. neither socially appropriate nor inappropriate. By socially appropriate, we mean behavior that **most people agree** is the "correct" or "ethical" thing to do.

**If you give the same response as that most frequently given by other participants in this experiment, then you will receive an additional \$ 3 as a bonus.**

The rules of the interaction in the recent study were as follows:

--- Original instructions of Take Game (TG-2 or TG-3) / player B1---

**Your task is to evaluate player B1's decision to take away the \$ 0.4 from A: If B1 took away the \$ 0.4 from A, would B1's action be rated by most people as "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or would it be rated as "neutral," i.e. neither socially appropriate nor inappropriate?**

You will have to indicate your belief by choosing one of the following five options:

- very socially inappropriate
- somewhat socially inappropriate
- neutral: neither socially inappropriate nor appropriate
- somewhat socially appropriate
- very socially appropriate

Note that we do not ask you to provide the rating you believe to be “right,” but the rating you believe will be the one most frequently chosen by the other participants in this experiment. Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess about the most frequently given response to the question.

#### *Control Questions*

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

Please answer the following questions about the rules of the interaction:

1. Suppose B1 takes away \$ 0.4 from A. Can B2 take away \$ 0.4 from A in this case?

\_\_\_Yes                      \_\_\_No

2. Suppose B1 does not take away \$ 0.4 from A. What will be B1's bonus payment?

B1's bonus payment: \_\_\_\_

3. Suppose B1 takes away \$ 0.4 from A. What will be B1's bonus payment, and what will be A's bonus payment?

B1's bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

Please answer the following question about your incentives to report your best possible guess about the most frequently given response by other participants:

4. If you give the same response as that most frequently given by other participants in this experiment, what will be your bonus payment?

**TAKE GAME – BELIEF ELICITATION (TG-2)***Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

*Instructions*

Recently we conducted an interactive study on Amazon Mechanical Turk. Your task is to make an estimate about the actual behavior of participants in this study. The rules of the interaction were as follows:

--- Original instructions of Take Game (TG-2) / player B1---

Your task is to estimate the behavior of players B2 in the cases in which B1 did not take away the money from A.

**What do you think: in what percent (%) of these cases was the money taken away from A by player B2?**

You will have to type in a guess between 0% - 100%. You will earn a bonus of \$ 3, if your estimate is not further than 5%-points away from the true value.

**Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess.**

*Control Questions*

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

Please answer the following questions about the rules of the interaction:

1. Suppose B1 takes away \$ 0.4 from A. Can B2 take away \$ 0.4 from A in this case?

\_\_\_Yes                      \_\_\_No

2. Suppose B1 does not take away \$ 0.4 from A. What will be B1's bonus payment?

B1's bonus payment: \_\_\_

3. Suppose B1 takes away \$ 0.4 from A. What will be B1's bonus payment, and what will be A's bonus payment?

B1's bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

Please answer the following question about your incentives to report your best possible guess:

4. If your guess is sufficiently close to the true value (not further away than 5%-points), what will be your bonus payment?

### TAKE GAME – BELIEF ELICITATION (TG-3)

#### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

#### *Instructions*

Recently we conducted an interactive study on Amazon Mechanical Turk. Your task is to make an estimate about the actual behavior of participants in this study. The rules of the interaction were as follows:

--- Original instructions of Take Game (TG-3) / player B1---

Your task is to guess the behavior of players B2 and B3 in the cases in which B1 did not take away the money from A.

**What do you think: in what percent (%) of these cases was the money taken away from A either by player B2 or, if not by player B2, then finally by player B3?**

You will have to type in a guess between 0% - 100%. You will earn a bonus of \$ 3, if your estimate is not further than 5%-points away from the true value.

**Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess.**

*Control Questions*

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

Please answer the following questions about the rules of the interaction:

1. Suppose B1 takes away \$ 0.4 from A. Can B2 take away \$ 0.4 from A in this case?

\_\_\_Yes                      \_\_\_No

2. Suppose B1 does not take away \$ 0.4 from A. What will be B1's bonus payment?

B1's bonus payment: \_\_\_\_

3. Suppose B1 takes away \$ 0.4 from A. What will be B1's bonus payment, and what will be A's bonus payment?

B1's bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

Please answer the following question about your incentives to report your best possible guess:

4. If your guess is sufficiently close to the true value (not further away than 5%-points), what will be your bonus payment?

## TAKE GAME – SPECTATOR TREATMENT

### Introduction

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

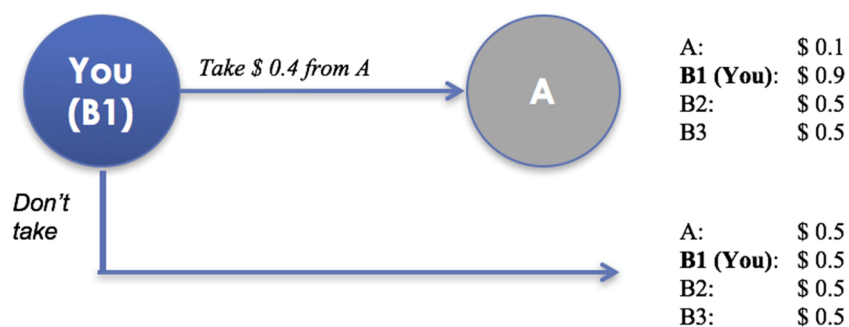
### Instructions

You are participating in a study with three other participants, also recruited via Amazon Mechanical Turk. There are players A, B1, B2 and B3. All four players start with an endowment of \$ 0.5 each. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.) You are player [insert role here].

The player B1 has the option to take away \$ 0.4 from A. Players B2 and B3 cannot make a decision in this study.

The following illustration shows the possible moves and payoffs, depending on your decision.

Figure provided to player B1 (figures provided to other participants analogous):



*Control Questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B:**

3. Suppose you do not take away \$ 0.4 from A. What will be your bonus payment?

Your bonus payment: \_\_\_\_

4. Suppose you take away \$ 0.4 from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**A:**

3. Suppose B1 does not take away \$ 0.4 from you. What will be your bonus payment?

Your bonus payment : \_\_\_\_

4. Suppose B1 takes away \$ 0.4 from you. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_

B1's bonus payment : \_\_\_\_



## ULTIMATUM GAME – UG-1

### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

### *Instructions*

You are participating in a study with another participant, also recruited via Amazon Mechanical Turk. There are players A and B. You are player [insert role here].

A total amount of \$ 1 can be split between player A and player B. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.)

First, player A decides whether

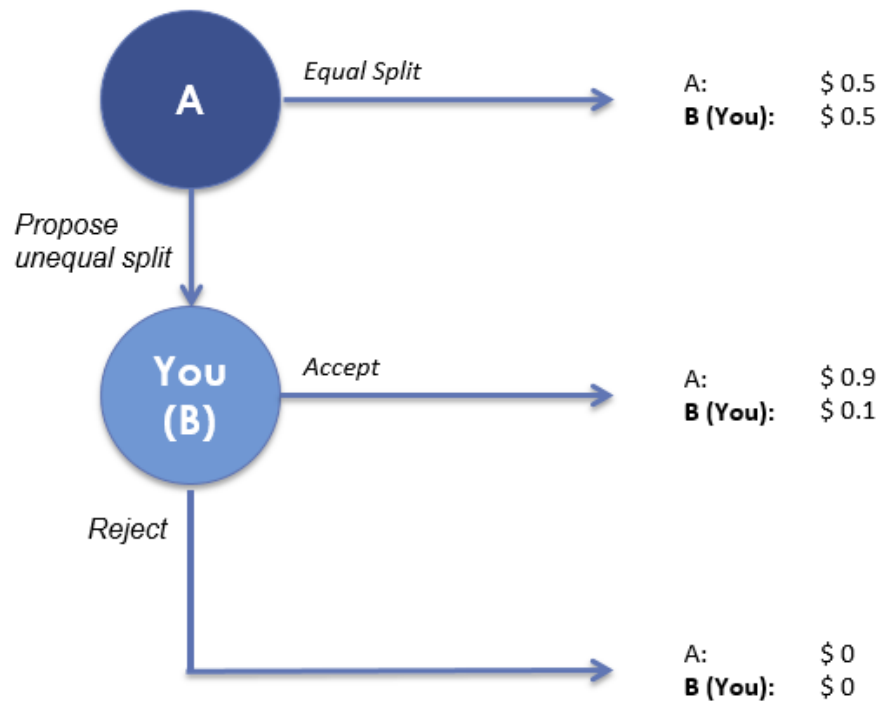
- to split the \$ 1 equally (\$ 0.5 for A and \$ 0.5 for B) or
- to propose an unequal split (\$ 0.9 for A and \$ 0.1 for B)

If A opts for the equal split, A and B receive \$ 0.5 each.

If A proposes the unequal split, B has the option to accept or reject the offer. If B accepts the offer, A receives \$ 0.9 and B receives \$ 0.1. If B rejects the offer, none of the players (A and B) receive a bonus payment.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participants.

Figure provided to player B1 (figures provided to other participants analogous):



*Control Questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B:**

1. Suppose A offers the unequal split and you reject the offer from A. What will be your bonus payment?

Your bonus payment: \_\_\_\_

2. Suppose A offers the unequal split and you accept the offer from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**A:**

1. Suppose you offer the unequal split and B rejects your offer. What will be your bonus payment?

Your bonus payment : \_\_\_\_

2. Suppose you offer the unequal split and B1 accepts your offer. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_

B1's bonus payment : \_\_\_\_

## ULTIMATUM GAME – UG-2

### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

### *Instructions*

You are participating in a study with two other participants, also recruited via Amazon Mechanical Turk. There are players A, B1 and B2. You are player [insert role here].

A total amount of \$ 1 can be split between player A and one of the two players B. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.)

First, player A decides whether

- to split the \$ 1 equally (\$ 0.5 for A and \$ 0.5 for B1) or
- to propose an unequal split (\$ 0.1 for A and \$ 0.9 for one of the players B)

If A chooses the equal split, A and B1 receive \$ 0.5 each.

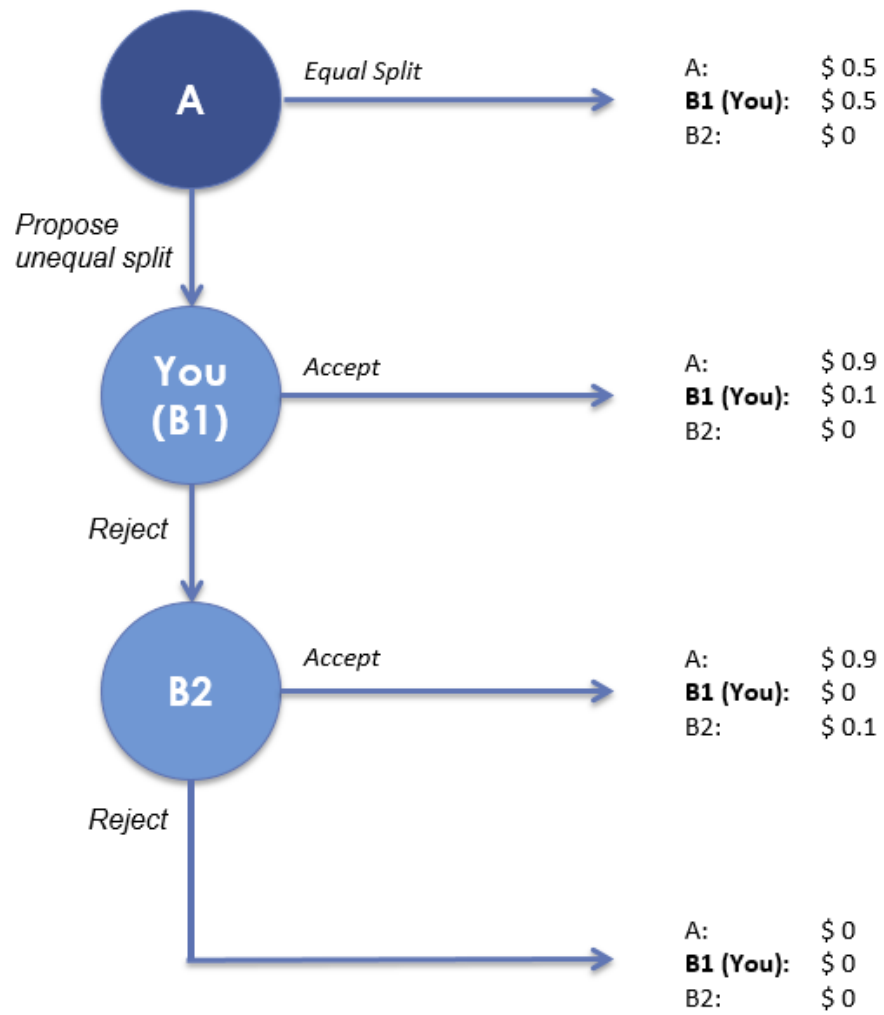
If A proposes the unequal split, the two players B have the option—one after the other—to accept the offer. First, B1 decides whether or not to accept the offer and then B2 decides.

However, the offer can be accepted only once. B2 thus can accept the offer only if B1 rejected it.

If a player B accepts the offer, the accepting player B receives \$ 0.1 and A receives \$ 0.9. If both players B reject the offer, none of the players (A, B1, and B2) receive a bonus payment.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participants.

Figure provided to player B1 (figures provided to other participants analogous):



*Control Questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B1:**

1. Suppose A proposes the unequal split and you accept the offer from A. Can B2 also accept the offer from A in this case?

\_\_\_Yes                      \_\_\_No

2. Suppose A proposes the unequal split and you reject the offer from A. What will be your bonus payment?

Your bonus payment: \_\_\_

3. Suppose A proposes the unequal split and you accept the offer from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**B2:**

1. Suppose A offers the unequal split and B1 accepts the offer from A. Can you accept the offer from A in this case?

\_\_\_Yes                      \_\_\_No

2. Suppose A offers the unequal split, B1 rejects the offer from A, and you reject the offer from A as well. What will be your bonus payment?

Your bonus payment : \_\_\_\_

3. Suppose A offers the unequal split and B1 rejects the offer from A. It is thus your move and suppose you decide to accept the offer.

What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**A:**

1. Suppose you offer the unequal split and B1 accepts your offer. Can B2 accept your offer in this case?

\_\_\_Yes              \_\_\_No

2. Suppose you offer the unequal split and B1 rejects your offer. Can B2 accept your offer in this case?

\_\_\_Yes              \_\_\_No

3. Suppose you offer the unequal split and B1 and B2 reject your offer. What will be your bonus payment?

Your bonus payment : \_\_\_\_

4. Suppose you offer the unequal split and B1 accepts your offer. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_

B1's bonus payment : \_\_\_\_

### ULTIMATUM GAME – UG-3

#### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

#### *Instructions*

You are participating in a study with three other participants, also recruited via Amazon Mechanical Turk. There are players A, B1, B2 and B3. You are player [insert role here].

A total amount of \$ 1 can be split between player A and one of the three players B. (Recall that this money comes on top of your fixed participation fee of \$ 0.5.)

First, player A decides whether

- to split the \$ 1 equally (\$ 0.5 for A and \$ 0.5 for B1) or
- to propose an unequal split (\$ 0.9 for A and \$ 0.1 for one of the players B)

If A chooses the equal split, A and B1 receive \$ 0.5 each.

If A proposes the unequal split, the three players B have the option—one after the other—to accept the offer. First, B1 decides whether or not to accept the offer, then B2 decides and finally B3.

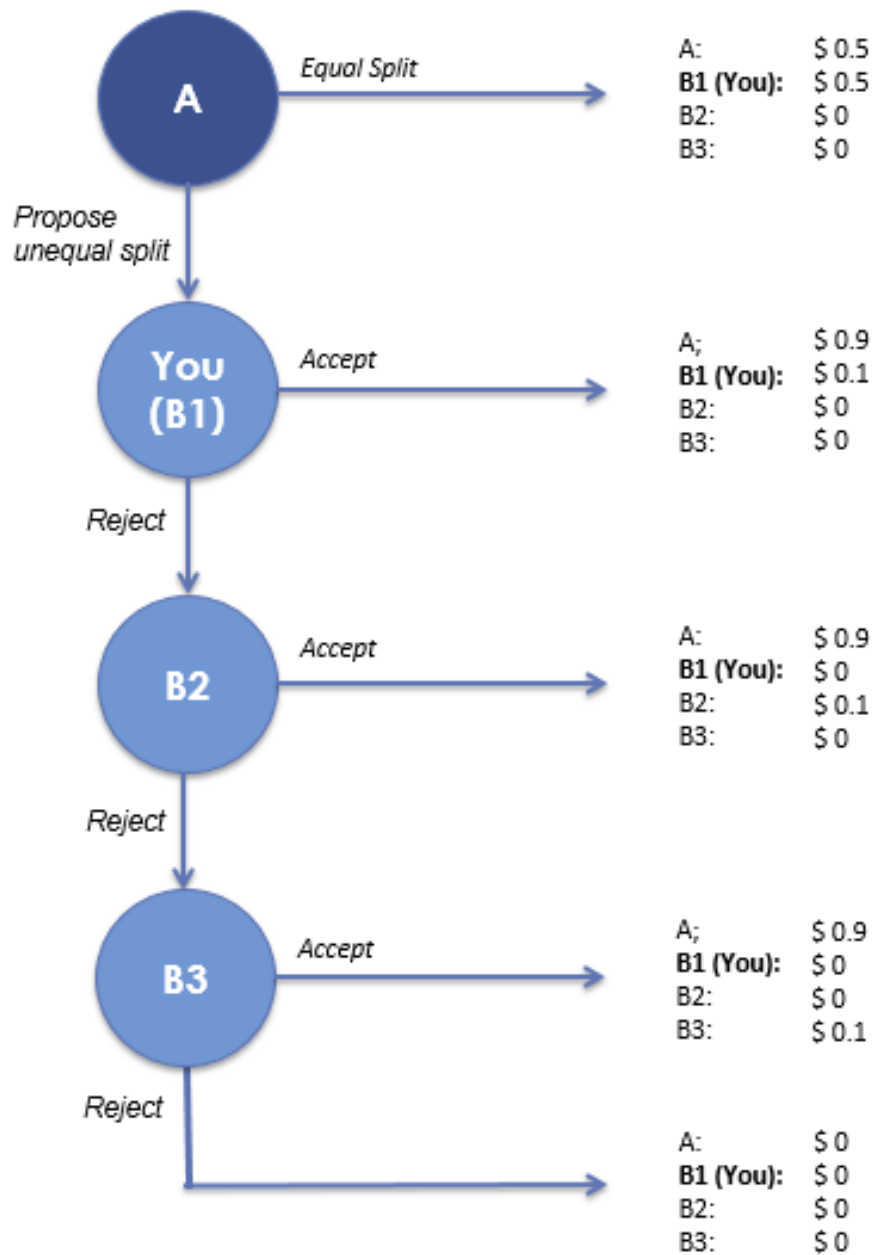
However, the offer can be accepted only once. B2 thus can accept the offer only if B1 rejected it, and B3 can accept the offer only if both B1 and B2 rejected it.

If a player B accepts the offer, the accepting player B receives \$ 0.1 and A receives \$ 0.9. If all three players B reject the offer, none of the players (A, B1, B2, and B3) receive a bonus payment.

The following illustration shows the possible moves and payoffs, depending on the decisions made by yourself and the other participants.



Figure provided to player B1 (figures provided to other participants analogous):



*Control Questions*

Please answer the following questions.

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

**B1:**

1. Suppose A proposes the unequal split and you accept the offer from A. Can B2 also accept the offer from A in this case?

\_\_\_Yes              \_\_\_No

2. Suppose A proposes the unequal split and you reject the offer from A. What will be your bonus payment?

Your bonus payment: \_\_\_

3. Suppose A proposes the unequal split and you accept the offer from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment: \_\_\_\_

A's bonus payment: \_\_\_\_

**B2:**

1. Suppose A offers the unequal split and B1 rejects the offer from A. It is thus your move and suppose you decide to accept the offer from A. Can B3 accept the offer from A in this case?

\_\_\_Yes              \_\_\_No

2. Suppose A offers the unequal split and B1 accepts the offer from A. Can you accept the offer from A in this case?

\_\_\_Yes              \_\_\_No

3. Suppose A offers the unequal split, B1 rejects the offer from A, and you reject the offer from A as well. What will be your bonus payment?

Your bonus payment : \_\_\_\_

4. Suppose A offers the unequal split and B1 rejects the offer from A. It is thus your move and suppose you decide to accept the offer. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**B3:**

1. Suppose A offers the unequal split and B1 accepts the offer from A. Can you accept the offer from A in this case?

\_\_\_Yes                  \_\_\_No

2. Suppose A offers the unequal split, B1 and B2 reject the offer from A, and you reject the offer from A as well. What will be your bonus payment?

Your bonus payment : \_\_\_\_

3. Suppose A offers the unequal split, and B1 and B2 reject the offer from A. It is thus your move and suppose you decide to accept the offer from A. What will be your bonus payment, and what will be A's bonus payment?

Your bonus payment : \_\_\_\_

A's bonus payment : \_\_\_\_

**A:**

1. Suppose you offer the unequal split and B1 accepts your offer. Can B2 accept your offer in this case?

\_\_\_Yes                  \_\_\_No

2. Suppose you offer the unequal split and B1 rejects your offer. Can B2 accept your offer in this case?

\_\_\_Yes                  \_\_\_No

3. Suppose you offer the unequal split and B1, B2 and B3 reject your offer. What will be your bonus payment?

Your bonus payment : \_\_\_\_

4. Suppose you offer the unequal split and B1 accepts your offer. What will be your bonus payment and what will be B1's bonus payment?

Your bonus payment : \_\_\_\_

B1's bonus payment : \_\_\_\_

## ULTIMATUM GAME – SOCIAL NORM ELICITATION (UG-1 / UG-2 / UG-3)

*(We elicited social norms for responder and proposer behavior in the lab in the same way as on MTurk, except that we used the original instructions and control questions of the study by Fehr, Fong, and Fischbacher (2009), and subjects could earn a bonus of 10 CHF.)*

### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

### *Instructions*

Recently we conducted an interactive study on Amazon Mechanical Turk. Your task is to evaluate a possible action of a participant in this study and to decide whether taking that action would be "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or "neutral," i.e. neither socially appropriate nor inappropriate. By socially appropriate, we mean behavior that **most people agree** is the "correct" or "ethical" thing to do.

**If you give the same response as that most frequently given by other participants in this experiment, then you will receive an additional \$ 3 as a bonus.**

The rules of the interaction in the recent study were as follows:

--- Original instructions of ultimatum game / UG-1, UG-2 or UG-3 / player B1---

### *Responder Norms:*

**Your task is to evaluate player B1's decision to accept the unequal offer:**  
If B1 accepted the unequal offer, would B1's action...

*Proposer Norms:*

**Your task is to evaluate player A's decision to make the unequal offer:** If player A made the unequal offer, would A's action...

...be rated by most people as "socially appropriate" and "consistent with moral or proper social behavior" or "socially inappropriate" and "inconsistent with moral or proper social behavior" or would it be rated as "neutral," i.e. neither socially appropriate nor inappropriate?

You will have to indicate your belief by choosing one of the following five options:

- very socially inappropriate
- somewhat socially inappropriate
- neutral: neither socially inappropriate nor appropriate
- somewhat socially appropriate
- very socially appropriate

Note that we do not ask you to provide the rating you believe to be "right," but the rating you believe will be the one most frequently chosen by the other participants in this experiment. Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess about the most frequently given response to the question.

*Control Questions*

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

**UG-1:**

Please answer the following questions about the rules of the interaction:

1. Suppose A offers the unequal split and B rejects the offer from A. What will be B's bonus payment?  
B's bonus payment: \_\_\_\_
2. Suppose A offers the unequal split and B accepts the offer from A. What will be B's bonus payment, and what will be A's bonus payment?  
B's bonus payment: \_\_\_\_  
A's bonus payment: \_\_\_\_

Please answer the following question about your incentives to report your best possible guess about the most frequently given response by other participants:

3. If you give the same response as that most frequently given by other participants in this experiment, what will be your bonus payment?

**UG-2 / UG-3:**

Please answer the following questions about the rules of the interaction:

1. Suppose A proposes the unequal split and B1 accepts the offer from A. Can B2 also accept the offer from A in this case?  
 \_\_\_Yes                      \_\_\_No
  
2. Suppose A proposes the unequal split and B1 rejects the offer from A. What will be B1's bonus payment?  
 B1's bonus payment: \_\_\_
  
3. Suppose A proposes the unequal split and B1 accepts the offer from A. What will be B1's bonus payment, and what will be A's bonus payment?  
 B1's bonus payment: \_\_\_\_  
 A's bonus payment: \_\_\_\_

Please answer the following question about your incentives to report your best possible guess about the most frequently given response by other participants:

4. If you give the same response as that most frequently given by other participants in this experiment, what will be your bonus payment?

### ULTIMATUM GAME – BELIEF ELICITATION (UG-2 / UG-3)

*(We elicited beliefs about replacement probabilities in the lab in the same way as on MTurk, except that we used the original instructions and control questions of the study by Fehr, Fong, and Fischbacher (2009), and subjects could earn a bonus of 10 CHF.)*

#### *Introduction*

Welcome to this research project! We very much appreciate your participation.

Please read the following instructions very carefully. After you click “OK” we will ask you some quiz questions to check your understanding of the instructions. You have to answer the questions correctly in order to receive your payment.

All dollar amounts mentioned in the instructions refer to your bonus payment, which will be paid out in addition to your fixed participation fee of \$ 0.5.

#### *Instructions*

Recently we conducted an interactive study on Amazon Mechanical Turk. Your task is to make an estimate about the actual behavior of participants in this study. The rules of the interaction were as follows:

--- Original instructions of ultimatum game / UG-2 or UG-3 / player B1---

#### *UG-2:*

Your task is to guess the behavior of players B2 in the cases in which A proposed the unequal split and B1 rejected the offer.

**What do you think: in what percent (%) of these cases was the unequal split accepted by player B2?**

You will have to type in a guess between 0% - 100%. You will earn a bonus of \$ 3, if your estimate is not further than 5%-points away from the true value.

**Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess.**



UG-3:

Your task is to guess the behavior of players B2 and B3 in the cases in which A proposed the unequal split and B1 rejected the offer.

**What do you think: in what percent (%) of these cases was the unequal split accepted by either player B2 or, if not by player B2, then finally by player B3?**

You will have to type in a guess between 0% - 100%. You will earn a bonus of \$ 3, if your estimate is not further than 5%-points away from the true value.

**Therefore, to maximize your chances of receiving the bonus of \$ 3, you should report your best possible guess.**

*Control Questions (UG-2/UG-3)*

Note that answering the control questions correctly is a requirement for a successful completion of the task.

All dollar amounts mentioned refer to bonus payments, which are paid out in addition to the fixed participation fee of \$ 0.5.

Please answer the following questions about the rules of the interaction:

1. Suppose A proposes the unequal split and B1 accepts the offer from A. Can B2 also accept the offer from A in this case?  
☐ Yes            ☐ No
  
2. Suppose A proposes the unequal split and B1 rejects the offer from A. What will be B1's bonus payment?  
 B1's bonus payment:
  
3. Suppose A proposes the unequal split and B1 accepts the offer from A. What will be B1's bonus payment, and what will be A's bonus payment?  
 B1's bonus payment:   
 A's bonus payment:

Please answer the following question about your incentives to report your best possible guess:

4. If your guess is sufficiently close to the true value (not further away than 5%-points), what will be your bonus payment?



## APPENDIX – THE SUPERIORITY OF DECENTRALIZATION IN SOCIAL NORM ENFORCEMENT

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### C.1 ADDITIONAL ANALYSES

In this section we show that the superiority of decentralization in sustaining cooperation cannot be explained by different reactions to punishment or by different punishment behavior. To analyze the effects of punishment on contribution decisions we estimate the following Probit regression model.

$$\Pr(\text{Cooperator} = 1|X) = \Phi(\beta X)$$

where  $\Phi$  is the cdf of the standard normal distribution and  $X$  is a matrix that includes the variables shown in [Table C.2](#). The labels of these variables are explained in [Table C.1](#).

[Table C.2](#) depicts the estimated coefficients and standard errors of the Probit regression model. The interaction terms `lag1RecLPun_CEN` and `lag1RecHPun_CEN` show how receiving low and high punishment (as compared to no punishment) affects the next period's contribution decision of defectors in the centralized social norm enforcement institution (as compared to the decentralized social norm enforcement institution). The coefficients are not significantly different from zero under both exogenous and endogenous monitoring; hence, defectors' reaction to punishment does not differ between the decentralized and centralized settings. Moreover, based on a Wald test<sup>1</sup>, we cannot reject the hypothesis that cooperators do not react differently to receiving low punishment in decentralized and centralized punishment institutions, under both exogenous and endogenous monitoring (exogenous monitoring,  $p=0.4845$ ; endogenous monitoring,  $p=0.1146$ ). Similarly, cooperators do not react differently to receiving high punishment in the Ex-DEC and Ex-CEN treatments (Wald test<sup>2</sup>,  $p=0.3933$ ). Under endogenous monitoring, cooperators seem to be less likely to defect in the decentralized institution as a reaction to high punishment than in the centralized institution (Wald test,  $p<0.001$ ). However,

<sup>1</sup> `lag1RecLPun_CEN + lag1Coop_lag1RecLPun_CEN = 0`

<sup>2</sup> `lag1RecHPun_CEN + lag1Coop_lag1RecHPun_CEN = 0`

VARIABLE	DESCRIPTION
Cooperator	1 if endowment was contributed to PG, else 0
TypeSocial	1 if Cooperator = 1 in $t = 1$ , else 0
CEN	1 if treatment I-CEN or C-CEN, else 0
lag1Coop	1 if Cooperator = 1 in previous period, else 0
lag1RecLPun	1 if received low punishment in previous period, else 0
lag1RecHPun	1 if received high punishment in previous period, else 0
lag1SumLastInfo	Sum of last received signals stating "cooperator"
Y_Z	interaction of variable Y and Z

Table C.1: Variables of the Probit model

the analysis is based on a limited sample size - cooperators received high punishment in only 8 instances (0.74%) in the End-DEC treatment and in only 21 instances (1.81%) in the End-CEN treatment.

Next, we compare the Ex-DEC and Ex-CEN treatments with respect to the probabilities that subjects who hold punishment power exert punishment, depending on the received signal. [Table C.3](#) shows, for each possible signal, the probabilities that either a player P in case of Ex-DEC or a player A in case of Ex-CEN makes a positive punishment decision. If the underlying signal stated "cooperator", Ps chose to punish in 6.2% of the cases and As chose to punish in 6.0% of the cases. Similarly if the underlying signal stated "defector", Ps chose to punish in 47.6% of the cases and As chose to punish in 49.3% of the cases. Since, the propensity to punish, given an underlying signal, does not differ between the centralized and decentralized social norm enforcement institutions, different effects of the punishment institutions on cooperation rates cannot be explained by punishment behavior.

	EXOGENOUS	ENDOGENOUS
Intercept	-0.8424*** [0.2164]	0.2096 [0.4893]
TypeSocial	0.6523*** [0.1036]	0.3311 [0.2033]
CEN	-0.3374 [0.2321]	-0.9423* [0.5270]
lag1Coop	1.3101*** [0.1645]	0.8756*** [0.1958]
lag1Coop_CEN	-0.1841 [0.2245]	0.1828 [0.3940]
lag1RecLPun	0.1977* [0.1191]	0.4580 [0.2862]
lag1RecHPun	0.5264** [0.2080]	1.0215*** [0.1824]
lag1RecLPun_CEN	0.0104 [0.1951]	0.0523 [0.3474]
lag1RecHPun_CEN	0.0679 [0.2595]	-0.5540 [0.4112]
lag1Coop_lag1RecLPun	-0.3831*** [0.1411]	-0.2909 [0.3199]
lag1Coop_lag1RecHPun	-0.7767** [0.3716]	2.7091*** [0.2615]
lag1Coop_lag1RecLPun_CEN	-0.1427 [0.2856]	-0.5620 [0.5040]
lag1Coop_lag1RecHPun_CEN	-0.2894 [0.4131]	-4.2732*** [0.5695]
lag1SumLastInfo	0.4632** [0.1915]	0.2685 [0.2492]
lag1SumLastInfo_CEN	0.2973 [0.2367]	0.7416** [0.3350]
Period	-0.0128*** [0.0032]	-0.0171*** [0.0051]
Observations	4896	2496
Pseudo R <sup>2</sup>	0.1923	0.1040

Table C.2: Probit model estimations for cooperation decision

*Note:* This table reports the Probit model estimations for the dependent variable Cooperator. Standard errors are clustered at the group level.

		EX-DEC	EX-CEN
Signal	Cooperator	0.062	0.060
	Defector	0.476	0.493

Table C.3: Positive punishment decisions depending on signal (in %)

*Note:* This table shows the fraction of subjects, among those who have punishment power, who exert punishment depending on the received signal.

## C.2 INSTRUCTIONS

In the following section we present English translations of all written instructions used in this study. Subjects were provided with instructions in German.

**OVERVIEW OF INSTRUCTIONS**

EX-DEC .....	220
EX-CEN .....	226
END-DEC .....	232
END-CEN .....	239

*Instructions Ex-DEC**Welcome to Econ-Lab!*

Please read the following instructions carefully. If you have any questions, please raise your hand. An assistant will approach you immediately.

*General remarks*

Today you are taking part in a study at the Department of Economics of the University of Zurich. You will receive a fixed payment of 15 CHF for your participation. Depending on the course of the study, you can earn an additional amount of money. You will receive your payment at the end of the study in cash. Please note that these instructions are exclusively for your private information and that communication is absolutely prohibited during the whole study. If you have any questions, please direct them towards the experimenters. Violating these rules leads to exclusion from this study and all payments. Data collected in this study will at no time be linked to your identity. Your name will be used exclusively for issuing the acknowledgment of your payment. Hence, your anonymity is guaranteed at all times.

*Short description of the procedures of the study*

At the beginning of the experiment you will be assigned to a group of five participants. Hence, in addition to you, there are four other members in your group. **The group composition does not change over the course of the experiment.** A group consists of **four participants A** and **one participant B**. The assignment to one of these two roles is determined randomly at the beginning of the experiment. Each participant sticks to his/her assigned role until the end of the experiment. The experiment consists of 25 periods. Each period is composed of three phases:

1. In the first phase participants A can decide whether or not to contribute to a common project of the group.
2. In the second phase all group members receive an information about the decisions that the participants have made. **This individual information is accurate with a certain probability only.** It is therefore possible that the information about the decision of certain group members is false. The specific pieces of infor-



mation conveyed to participants are independent of each other and can therefore be different from one another.

3. In the third phase each participant A can spend money in order to reduce the income of other participants A of the group. At the end of each period group members are informed about how much their income was reduced in total.

On the next pages we describe the exact procedures of the experiment.

### *PROCEDURES OF THE STUDY*

At the beginning of the experiment you are informed about your randomly assigned role. There are four participants A and one participant B in your group. **You are either a participant A or the participant B. The assignment to one of those two roles is fixed for the whole duration of the experiment.**

You will receive experimental currency units (so-called Token) over the course of the experiment. **1 Token corresponds to 0.05 CHF.** The experiment consists of 25 periods. **At the end of the experiment, the sum of all the Token you have collected over the 25 periods is converted to CHF and paid out to you. You receive this amount in addition to your fixed payment.** The income of a single period may be negative. **You receive an additional payment of 0 CHF if the sum of all your period incomes is negative (your fixed payment of 15 CHF remains unaffected).**

#### *Participant B*

As participant B you do not make any decisions during the experiment. However, in each period you receive a share of the project's profit, which depends on the decisions of participants A. The profit of the project is split equally among all five group members. In each period you receive information about whether the participants A contributed to the project. Details can be found below in the section "phases of the experiment".

#### *Participant A*

As one of the four participants A you decide in each of the 25 periods whether or not you want to contribute to the common project. In each period you receive a share of the project's profit that depends on the

decisions of all participants A. The profit of the project is split equally among all five group members. Furthermore, like participant B, you receive information about whether or not the other participants A contributed to the project. Afterwards, you can punish particular participants A by reducing their income. Details can be found below in the section "phases of the experiment".

### *Phases of the experiment*

#### *Phase 1 – Decision about the contribution to the project*

As participant A you are endowed with an amount of 15 Token at the beginning of each period. You have to choose one of two options:

1. Either you contribute the 15 Token to the common project or
2. You keep the 15 Token.

**All group members (participants A as well as participant B) profit equally from contributions to the common project. The sum of contributions is first doubled and then split equally among all group members.**

If a group member contributes the 15 Token to the project, the income from the project increases by  $\frac{(15 \cdot 2)}{5} = 6$  Token for each group member.

As participant B you receive a share of the project's income, but you do not make any decisions yourself.

**In this phase, you are not informed about the actual income from the project - neither as participant A nor as participant B. Only at the end of the experiment (i.e. after 25 periods) all participants are informed about their total earnings in each period.**

project income per group member = number of contributing participants x 6 Token
---

Examples:

- Suppose all participants A contribute 15 Token to the common project. Then each group member gets  $6 \text{ Token} \cdot 4 = 24 \text{ Token}$  from the project.

- Suppose no one contributes to the project. Then all participants A keep their 15 Token and participant B receives 0 additional Token.
- Suppose you are participant A and you do not contribute to the project. Each of the other three participants A contributes 15 Token to the project. Then you keep your 15 Token and you receive an additional  $3 \times 6$  Token = 18 Token from the project. Hence, in total you get 33 Token. Each other group member receives  $3 \times 6$  Token = 18 Token from the project.

*Phase 2 – Information about contributions of other participants:*

In this phase all group members (participants A and B) individually receive an independent information about each participant A's contribution decision. **Each piece of information is correct with a probability of 90% and false with a probability of 10%. Hence,**

- when a participant A actually contributes 15 Token, then you receive the information "15 Token" with 90% probability and the information "0 Token" with 10% probability.
- when a participant A actually contributes 0 Token, then you receive the information "0 Token" with 90% probability and the information "15 Token" with 10% probability.

The pieces of information are provided individually and are independent of each other. **Therefore, it is possible that two group members receive different information about the actions of one and the same participant A.** You do not learn the information received by other group members.

**The labels of participants A are randomly reassigned each period.** For example, "participant A2" in the first period is not necessarily the same person as "participant A2" in the second period.

*Phase 3 – Decision about punishment of other participants:*

In this phase participants A have the possibility to punish other participants A by reducing their period income.

**If you as a participant A decide to punish another participant A, then 8 Token are deducted from his/her period income. You have to pay 2 Token in order to punish another participant A. For that purpose you are endowed with an additional 6 Token in this phase.**

Hence, you can punish a) no participant A, b) one participant A, c) two participants A or d) all three participants A.

Participant B has to bear costs of 2 Token for each exerted punishment as well. For that purpose participant B is endowed with additional 24 Token. However, participant B does not make any punishment decisions. At the end of each period all participants A are informed about the punishment they have received. They learn by how many participants they were punished and by how much their income was reduced in total.

*Overview of total income within one period*

$$\begin{aligned}
 &\text{period income of a participant A} \\
 &= \\
 &(15 \text{ Token}) - (\text{contribution to project}) \\
 &+ \\
 &(6 \text{ Token} \times \text{number of contributing participants}) \\
 &+ \\
 &(6 \text{ Token}) - (2 \text{ Token} \times \text{number of assigned punishments}) \\
 &- \\
 &(8 \text{ Token} \times \text{number of received punishments})
 \end{aligned}$$

$$\begin{aligned}
 &\text{period income of participant B} \\
 &= \\
 &(6 \text{ Token} \times \text{number of contributing participants}) \\
 &+ \\
 &(24 \text{ Token}) - (2 \text{ Token} \times \text{sum of all assigned punishments})
 \end{aligned}$$

*Control questions*

Please answer the following questions and raise your hand.

*1. Question*

Suppose you are participant A and no participant A has contributed to the common project. Suppose further that no participant A makes use of the possibility to punish. What is your period income (please keep in mind that you are endowed with an additional 6 Token in phase 3)

Your period income (in Token) \_\_\_\_\_

2. *Question*

Suppose you are a participant A and you have contributed to the common project. In addition to you, two other participants A have contributed to the project. Suppose further that you punish one participant A and that you do not receive any punishment yourself.

- a) What is your period income? Your period income (in Token) \_\_\_\_\_
- b) Now suppose that you are punished by two participants A. What is your period income in this case?

Your period income (in Token) \_\_\_\_\_

3. *Question*

Suppose you receive the information that participant A2 has not contributed to the project.

- a) What is the probability that this information about participant A2 is correct?

\_\_\_\_\_

- b) Do all group members necessarily receive the same information about the contribution of participant A2?

\_\_\_\_\_YES \_\_\_\_\_NO

- c) Next period you receive new information about the contribution of participant A2. Does participant A2 necessarily correspond the same actual person as in the previous period?

\_\_\_\_\_YES \_\_\_\_\_NO

*Instructions Ex-CEN**Welcome to Econ-Lab!*

Please read the following instructions carefully. If you have any questions, please raise your hand. An assistant will approach you immediately.

*General remarks*

Today you are taking part in a study at the Department of Economics of the University of Zurich. You will receive a fixed payment of 15 CHF for your participation. Depending on the course of the study, you can earn an additional amount of money. You will receive your payment at the end of the study in cash. Please note that these instructions are exclusively for your private information and that communication is absolutely prohibited during the whole study. If you have any questions, please direct them towards the experimenters. Violating these rules leads to exclusion from this study and all payments. Data collected in this study will at no time be linked to your identity. Your name will be used exclusively for issuing the acknowledgment of your payment. Hence, your anonymity is guaranteed at all times.

*Short description of the procedures of the study*

At the beginning of the experiment you will be assigned to a group of five participants. Hence, in addition to you, there are four other members in your group. **The group composition does not change over the course of the experiment.** A group consists of **four participants A** and **one participant B**. The assignment to one of these two roles is determined randomly at the beginning of the experiment. Each participant sticks to his/her assigned role until the end of the experiment. The experiment consists of 25 periods. Each period is composed of three phases:

1. In the first phase participants A can decide whether or not to contribute to a common project of the group.
2. In the second phase all group members receive an information about the decisions that the participants have made. **This individual information is accurate with a certain probability only.** It is therefore possible that the information about the decision of certain group members is false. The specific pieces of infor-

mation conveyed to participants are independent of each other and can therefore be different from one another.

3. In the third phase each participant B can spend money in order to reduce the income of participants A of the group. At the end of each period group members are informed about how much their income was reduced in total.

On the next pages we describe the exact procedures of the experiment.

### *PROCEDURES OF THE STUDY*

At the beginning of the experiment you are informed about your randomly assigned role. There are four participants A and one participant B in your group. **You are either a participant A or the participant B. The assignment to one of those two roles is fixed for the whole duration of the experiment.**

You will receive experimental currency units (so-called Token) over the course of the experiment. **1 Token corresponds to 0.05 CHF.** The experiment consists of 25 periods. **At the end of the experiment, the sum of all the Token you have collected over the 25 periods is converted to CHF and paid out to you. You receive this amount in addition to your fixed payment.** The income of a single period may be negative. **You receive an additional payment of 0 CHF if the sum of all your period incomes is negative (your fixed payment of 15 CHF remains unaffected).**

#### *Participant B*

As participant B you do not make any decisions during the first two phases of the experiment. However, in each period you receive a share of the project's profit, which depends on the decisions of participants A. The profit of the project is split equally among all five group members. In each period you receive information about whether the participants A contributed to the project. In the third phase of each period you can punish participants A by reducing their income. Details can be found below in the section "phases of the experiment".

#### *Participant A*

As one of the four participants A you decide in each of the 25 periods whether or not you want to contribute to the common project. In each

period you receive a share of the project's profit that depends on the decisions of all participants A. The profit of the project is split equally among all five group members. Furthermore, like participant B, you receive information about whether or not the other participants A contributed to the project. In the third phase you do not make any decision. You are, however, informed whether and how severe you were punished by participant B. Details can be found below in the section "phases of the experiment".

### *Phases of the experiment*

#### *Phase 1 – Decision about the contribution to the project*

As participant A you are endowed with an amount of 15 Token at the beginning of each period. You have to choose one of two options:

1. Either you contribute the 15 Token to the common project or
2. You keep the 15 Token.

**All group members (participants A as well as participant B) profit equally from contributions to the common project. The sum of contributions is first doubled and then split equally among all group members.**

If a group member contributes the 15 Token to the project, the income from the project increases by  $\frac{(15 \times 2)}{5} = 6$  Token for each group member.

As participant B you receive a share of the project's income, but you do not make any decisions yourself.

**In this phase, you are not informed about the actual income from the project - neither as participant A nor as participant B. Only at the end of the experiment (i.e. after 25 periods) all participants are informed about their total earnings in each period.**

project income per group member
=
number of contributing participants x 6 Token

Examples:

- Suppose all participants A contribute 15 Token to the common project. Then each group member gets  $6 \text{ Token} \times 4 = 24 \text{ Token}$  from the project.



- Suppose no one contributes to the project. Then all participants A keep their 15 Token and participant B receives 0 additional Token.
- Suppose you are participant A and you do not contribute to the project. Each of the other three participants A contributes 15 Token to the project. Then you keep your 15 Token and you receive an additional  $3 \times 6$  Token = 18 Token from the project. Hence, in total you get 33 Token. Each other group member receives  $3 \times 6$  Token = 18 Token from the project.

*Phase 2 – Information about contributions of other participants:*

In this phase all group members (participants A and B) individually receive an independent information about each participant A's contribution decision. **Each piece of information is correct with a probability of 90% and false with a probability of 10%. Hence,**

- when a participant A actually contributes 15 Token, then you receive the information "15 Token" with 90% probability and the information "0 Token" with 10% probability.
- when a participant A actually contributes 0 Token, then you receive the information "0 Token" with 90% probability and the information "15 Token" with 10% probability.

The pieces of information are provided individually and are independent of each other. **Therefore, it is possible that two group members receive different information about the actions of one and the same participant A.** You do not learn the information received by other group members.

**The labels of participants A are randomly reassigned each period.** For example, "participant A2" in the first period is not necessarily the same person as "participant A2" in the second period.

*Phase 3 – Decision about punishment of other participants:*

In this phase participant B has the possibility to punish participants A by reducing their period income.

**As a participant B you decide in every period whether to reduce a participant A's income by a) 0 Token, b) 8 Token, c) 16 Token or d) 24 Token. You have to pay 1 Token per every 4 Token that are**

**deducted from a participant A's income. For that purpose you are endowed with additional 24 Token in this phase.**

The other three participants A have to bear total costs of 1 Token per 4 Token that are deducted from the fourth participant A. These total costs are split equally among the three other participants A. For that purpose each participant A is endowed with an additional 6 Token.

If for example, participant B reduces the income of one participant A by 24 Token then the other three participants A have to pay 6 Token in total, i.e. 2 Token each.

At the end of each period all participants A are informed about the punishment they have received. They do not learn about the punishment of other participants A.

*Overview of total income within one period*

$$\begin{aligned}
 &\text{period income of a participant A} \\
 &= \\
 &(15 \text{ Token}) - (\text{contribution to project}) \\
 &+ \\
 &(6 \text{ Token} \times \text{number of contributing participants}) \\
 &+ \\
 &(6 \text{ Token}) \\
 &- \\
 &(\frac{1}{4} \times \frac{1}{3} \text{ Token} \times \text{sum of punishment of other participants A by B}) \\
 &- \\
 &(\text{received punishments by participant B})
 \end{aligned}$$

$$\begin{aligned}
 &\text{period income of participant B} \\
 &= \\
 &(6 \text{ Token} \times \text{number of contributing participants}) \\
 &+ \\
 &(24 \text{ Token}) \\
 &- \\
 &(\frac{1}{4} \text{ Token} \times \text{sum of all assigned punishments to A})
 \end{aligned}$$

*Control questions*

Please answer the following questions and raise your hand.

*1. Question*

Suppose you are participant A and no participant A has contributed to the common project. Suppose participant B does not make use of the possibility to punish.

What is your period income (please keep in mind that you are endowed with an additional 6 Token in phase 3)

Your period income (in Token) \_\_\_\_\_

*2. Question*

Suppose you are a participant A and you have contributed to the common project. The other three participants A have also contributed to the project. Suppose further that you are punished with 24 Token (your income is reduced by 24 Token) by participant B and that no other participant A is punished.

What is your period income? Your period income (in Token) \_\_\_\_\_

*3. Question*

Suppose you receive the information that participant A2 has not contributed to the project.

a) What is the probability that this information about participant A2 is correct?

\_\_\_\_\_

b) Do all group members necessarily receive the same information about the contribution of participant A2?

\_\_\_\_\_YES \_\_\_\_\_NO

c) Next period you receive new information about the contribution of participant A2. Does participant A2 necessarily correspond the same actual person as in the previous period?

\_\_\_\_\_YES \_\_\_\_\_NO

*4. Question* Suppose you are participant B and two participants A have contributed to the common project. Suppose further that you punish two participants with 24 Token (you reduce the income of two participants A by 24 Token).

What is your period income? Your period income (in Token)\_\_\_\_\_

*Instructions End-DEC**Welcome to Econ-Lab!*

Please read the following instructions carefully. If you have any questions, please raise your hand. An assistant will approach you immediately.

*General remarks*

Today you are taking part in a study at the Department of Economics of the University of Zurich. You will receive a fixed payment of 15 CHF for your participation. Depending on the course of the study, you can earn an additional amount of money. You will receive your payment at the end of the study in cash. Please note that these instructions are exclusively for your private information and that communication is absolutely prohibited during the whole study. If you have any questions, please direct them towards the experimenters. Violating these rules leads to exclusion from this study and all payments. Data collected in this study will at no time be linked to your identity. Your name will be used exclusively for issuing the acknowledgment of your payment. Hence, your anonymity is guaranteed at all times.

*Short description of the procedures of the study*

At the beginning of the experiment you will be assigned to a group of five participants. Hence, in addition to you, there are four other members in your group. **The group composition does not change over the course of the experiment.** A group consists of **four participants A** and **one participant B**. The assignment to one of these two roles is determined randomly at the beginning of the experiment. Each participant sticks to his/her assigned role until the end of the experiment. The experiment consists of 25 periods. Each period is composed of three phases:

1. In the first phase participants A can decide whether or not to contribute to a common project of the group.
2. In the second phase all group members receive an information (free of charge) about the decisions that the participants have made. **This individual information is accurate with a certain probability only.** It is therefore possible that the information about the decision of certain group members is false. The specific pieces of information conveyed to participants are inde-

pendent of each other and can therefore be different from one another. In order to improve your information base you can buy further information about other group members. The new information is also accurate with a certain probability only.

3. In the third phase each participant A can spend money in order to reduce the income of other participants A of the group. At the end of each period group members are informed about how much their income was reduced in total.

On the next pages we describe the exact procedures of the experiment.

### *PROCEDURES OF THE STUDY*

At the beginning of the experiment you are informed about your randomly assigned role. There are four participants A and one participant B in your group. **You are either a participant A or the participant B. The assignment to one of those two roles is fixed for the whole duration of the experiment.**

You will receive experimental currency units (so-called Token) over the course of the experiment. **1 Token corresponds to 0.05 CHF.** The experiment consists of 25 periods. **At the end of the experiment, the sum of all the Token you have collected over the 25 periods is converted to CHF and paid out to you. You receive this amount in addition to your fixed payment.** The income of a single period may be negative. **You receive an additional payment of 0 CHF if the sum of all your period incomes is negative (your fixed payment of 15 CHF remains unaffected).**

#### *Participant B*

As participant B you do not make any decisions during the experiment. However, in each period you receive a share of the project's profit, which depends on the decisions of participants A. The profit of the project is split equally among all five group members. In each period you receive information about whether the participants A contributed to the project. Details can be found below in the section "phases of the experiment".

*Participant A*

As one of the four participants A you decide in each of the 25 periods whether or not you want to contribute to the common project. In each period you receive a share of the project's profit that depends on the decisions of all participants A. The profit of the project is split equally among all five group members. Furthermore, like participant B, you receive information about whether or not the other participants A contributed to the project. Afterwards, you can acquire further information about the behavior of other participants A in order to improve your information base. Finally, you can punish particular participants A by reducing their income. Details can be found below in the section "phases of the experiment".

*Phases of the experiment**Phase 1 – Decision about the contribution to the project*

As participant A you are endowed with an amount of 15 Token at the beginning of each period. You have to choose one of two options:

1. Either you contribute the 15 Token to the common project or
2. You keep the 15 Token.

**All group members (participants A as well as participant B) profit equally from contributions to the common project. The sum of contributions is first doubled and then split equally among all group members.**

If a group member contributes the 15 Token to the project, the income from the project increases by  $\frac{(15 \times 2)}{5} = 6$  Token for each group member.

As participant B you receive a share of the project's income, but you do not make any decisions yourself.

**In this phase, you are not informed about the actual income from the project - neither as participant A nor as participant B. Only at the end of the experiment (i.e. after 25 periods) all participants are informed about their total earnings in each period.**

project income per group member
=
number of contributing participants x 6 Token

Examples:

- Suppose all participants A contribute 15 Token to the common project. Then each group member gets  $6 \text{ Token} \times 4 = 24 \text{ Token}$  from the project.
- Suppose no one contributes to the project. Then all participants A keep their 15 Token and participant B receives 0 additional Token.
- Suppose you are participant A and you do not contribute to the project. Each of the other three participants A contributes 15 Token to the project. Then you keep your 15 Token and you receive an additional  $3 \times 6 \text{ Token} = 18 \text{ Token}$  from the project. Hence, in total you get 33 Token. Each other group member receives  $3 \times 6 \text{ Token} = 18 \text{ Token}$  from the project.

*Phase 2 – Information about contributions of other participants:*

In this phase all group members (participants A and B) individually receive an independent information about each participant A's contribution decision. **Each piece of information is correct with a probability of 90% and false with a probability of 10%. Hence,**

- when a participant A actually contributes 15 Token, then you receive the information "15 Token" with 90% probability and the information "0 Token" with 10% probability.
- when a participant A actually contributes 0 Token, then you receive the information "0 Token" with 90% probability and the information "15 Token" with 10% probability.

The pieces of information are provided individually and are independent of each other. **Therefore, it is possible that two group members receive different information about the actions of one and the same participant A.** You do not learn the information received by other group members.

Afterwards, all four participants A have the possibility to acquire up to two further pieces of information about each of the other three participants A. Hence, in total each participant A can buy 6 additional pieces of information (2 pieces of information  $\times$  3 other participants A). One new piece of information costs 1 Token for the acquiring participant A. Participant B also has to bear costs of 1 Token for each new piece of information that is acquired.

Like the initial three pieces of costless information, all new pieces of information are independent of each other and with 90% probability true and with 10% probability false. New pieces of information are acquired sequentially, i.e. one after another. You can stop to buy further information at any time.

**The labels of participants A are randomly reassigned each period. For example, "participant A2" in the first period is not necessarily the same person as "participant A2" in the second period.**

*Phase 3 – Decision about punishment of other participants:*

In this phase participants A have the possibility to punish other participants A by reducing their period income.

**If you as a participant A decide to punish another participant A, then 8 Token are deducted from his/her period income. You have to pay 2 Token in order to punish another participant A. Hence, you can punish a) no participant A, b) one participant A, c) two participants A or d) all three participants A.**

Participant B has to bear costs of 2 Token for each exerted punishment as well. However, participant B does not make any punishment decisions.

At the end of each period all participants A are informed about the punishment they have received. They learn by how many participants they were punished and by how much their income was reduced in total.



*Overview of total income within one period*

$$\begin{aligned}
 &\text{period income of a participant A} \\
 &= \\
 & (15 \text{ Token}) - (\text{contribution to project}) \\
 & + \\
 & (6 \text{ Token} \times \text{number of contributing participants}) \\
 & + \\
 & (6 \text{ Token}) - (1 \text{ Token} \times \text{number of acquired pieces of information}) \\
 & - \\
 & (2 \text{ Token} \times \text{number of assigned punishments}) \\
 & - \\
 & (8 \text{ Token} \times \text{number of received punishments})
 \end{aligned}$$

$$\begin{aligned}
 &\text{period income of participant B} \\
 &= \\
 & (6 \text{ Token} \times \text{number of contributing participants}) \\
 & + \\
 & (24 \text{ Token}) \\
 & - \\
 & (1 \text{ Token} \times \text{total number of acquired pieces of information}) \\
 & - \\
 & (2 \text{ Token} \times \text{sum of all assigned punishments})
 \end{aligned}$$

*Control questions*

Please answer the following questions and raise your hand.

*1. Question*

Suppose you are participant A and no participant A has contributed to the common project. Suppose further that no participant A makes use of the possibility to punish. What is your period income if no further information is acquired (please keep in mind that you are endowed with an additional 6 Token in phase 3)?

Your period income (in Token) \_\_\_\_\_

*2. Question*

Suppose you are a participant A and you have contributed to the

common project. In addition to you, two other participants A have contributed to the project. Suppose further that you punish one participant A and that you do not receive any punishment yourself. Furthermore, you buy one additional piece of information for each of the other three participants A.

a) What is your period income? Your period income (in Token) \_\_\_\_\_

b) Now suppose that you are punished by two participants A. What is your period income in this case?

Your period income (in Token) \_\_\_\_\_

### 3. Question

Suppose you receive the information that participant A2 has not contributed to the project.

a) What is the probability that this information about participant A2 is correct?

\_\_\_\_\_

b) Do all group members necessarily receive the same information about the contribution of participant A2?

\_\_\_\_\_YES \_\_\_\_\_NO

c) Suppose you want to acquire one additional piece of information about participant A2.

How much do you have to pay for that? \_\_\_\_\_Token What is the probability that this newly acquired information about participant A2 is correct?

\_\_\_\_\_

d) Next period you receive new information about the contribution of participant A2. Does participant A2 necessarily correspond the same actual person as in the previous period?

\_\_\_\_\_YES \_\_\_\_\_NO

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1. In the first phase participants A can decide whether or not to contribute to a common project of the group.
2. In the second phase all group members receive an information (free of charge) about the decisions that the participants have made. **This individual information is accurate with a certain probability only.** It is therefore possible that the information about the decision of certain group members is false. The specific pieces of information conveyed to participants are inde-

pendent of each other and can therefore be different from one another. In order to improve your information base participant B can buy further information about other group members. The new information is also accurate with a certain probability only.

3. In the third phase each participant B can spend money in order to reduce the income of participants A of the group. At the end of each period group members are informed about how much their income was reduced in total.

On the next pages we describe the exact procedures of the experiment.

### *PROCEDURES OF THE STUDY*

At the beginning of the experiment you are informed about your randomly assigned role. There are four participants A and one participant B in your group. **You are either a participant A or the participant B. The assignment to one of those two roles is fixed for the whole duration of the experiment.**

You will receive experimental currency units (so-called Token) over the course of the experiment. **1 Token corresponds to 0.05 CHF.** The experiment consists of 25 periods. **At the end of the experiment, the sum of all the Token you have collected over the 25 periods is converted to CHF and paid out to you. You receive this amount in addition to your fixed payment.** The income of a single period may be negative. **You receive an additional payment of 0 CHF if the sum of all your period incomes is negative (your fixed payment of 15 CHF remains unaffected).**

#### *Participant B*

As participant B you do not make any decisions during the first phase of the experiment. However, in each period you receive a share of the project's profit, which depends on the decisions of participants A. The profit of the project is split equally among all five group members. In each period you receive information about whether the participants A contributed to the project. Afterwards, you can acquire further information about the behavior of other participants A in order to improve your information base. In the third phase of each period you can punish participants A by reducing their income. Details can be found below in the section "phases of the experiment".

*Participant A*

As one of the four participants A you decide in each of the 25 periods whether or not you want to contribute to the common project. In each period you receive a share of the project's profit that depends on the decisions of all participants A. The profit of the project is split equally among all five group members. Furthermore, like participant B, you receive information about whether or not the other participants A contributed to the project. In the third phase you do not make any decision. Details can be found below in the section "phases of the experiment".

*Phases of the experiment**Phase 1 – Decision about the contribution to the project*

As participant A you are endowed with an amount of 15 Token at the beginning of each period. You have to choose one of two options:

1. Either you contribute the 15 Token to the common project or
2. You keep the 15 Token.

**All group members (participants A as well as participant B) profit equally from contributions to the common project. The sum of contributions is first doubled and then split equally among all group members.**

If a group member contributes the 15 Token to the project, the income from the project increases by  $\frac{(15 \cdot 2)}{5} = 6$  Token for each group member.

As participant B you receive a share of the project's income, but you do not make any decisions yourself.

**In this phase, you are not informed about the actual income from the project - neither as participant A nor as participant B. Only at the end of the experiment (i.e. after 25 periods) all participants are informed about their total earnings in each period.**

project income per group member
=
number of contributing participants x 6 Token

Examples:

- Suppose all participants A contribute 15 Token to the common project. Then each group member gets  $6 \text{ Token} \times 4 = 24 \text{ Token}$  from the project.
- Suppose no one contributes to the project. Then all participants A keep their 15 Token and participant B receives 0 additional Token.
- Suppose you are participant A and you do not contribute to the project. Each of the other three participants A contributes 15 Token to the project. Then you keep your 15 Token and you receive an additional  $3 \times 6 \text{ Token} = 18 \text{ Token}$  from the project. Hence, in total you get 33 Token. Each other group member receives  $3 \times 6 \text{ Token} = 18 \text{ Token}$  from the project.

*Phase 2 – Information about contributions of other participants:*

In this phase all group members (participants A and B) individually receive an independent information about each participant A's contribution decision. **Each piece of information is correct with a probability of 90% and false with a probability of 10%. Hence,**

- when a participant A actually contributes 15 Token, then you receive the information "15 Token" with 90% probability and the information "0 Token" with 10% probability.
- when a participant A actually contributes 0 Token, then you receive the information "0 Token" with 90% probability and the information "15 Token" with 10% probability.

The pieces of information are provided individually and are independent of each other. Therefore, it is possible that two group members receive different information about the actions of one and the same participant A. You do not learn the information received by other group members.

Afterwards, participant B has the possibility to acquire up to two further pieces of information about each of the four participants A. Hence, in total each participant A can buy 8 additional pieces of information (2 pieces of information  $\times$  3 other participants A). One new piece of information costs 3 Token for participant B.

Information acquired by participant B is conveyed to the other three participants A. Each participant A also has to bear costs of 1 Token for each new piece of information that he or she receives.

Like the initial three pieces of costless information, all new pieces of information are independent of each other and with 90% probability true and with 10% probability false. New pieces of information are acquired sequentially, i.e. one after another. You can stop to buy further information at any time.

**The labels of participants A are randomly reassigned each period.** For example, "participant A2" in the first period is not necessarily the same person as "participant A2" in the second period.

*Phase 3 – Decision about punishment of other participants:*

In this phase participant B has the possibility to punish participants A by reducing their period income.

**As a participant B you decide in every period whether to reduce a participant A's income by a) 0 Token, b) 8 Token, c) 16 Token or d) 24 Token. You have to pay 1 Token per every 4 Token that are deducted from a participant A's income. For that purpose you are endowed with additional 24 Token in this phase.**

The other three participants A have to bear **total** costs of 1 Token per 4 Token that are deducted from the fourth participant A. These total costs are split equally among the three other participants A. For that purpose each participant A is endowed with an additional 6 Token.

If for example, participant B reduces the income of one participant A by 24 Token then the other three participants A have to pay 6 Token in total, i.e. 2 Token each.

At the end of each period all participants A are informed about the punishment they have received. They do not learn the punishment of other participants A.

*Overview of total income within one period*

$$\begin{aligned}
 &\text{period income of a participant A} \\
 &= \\
 &\quad (15 \text{ Token}) - (\text{contribution to project}) + \\
 &\quad (6 \text{ Token} \times \text{number of contributing participants}) \\
 &\quad + \\
 &\quad (6 \text{ Token}) \\
 &\quad - \\
 &\quad (1 \text{ Token} \times \text{further pieces of information about participants A}) \\
 &\quad - \\
 &\quad (\frac{1}{12} \text{ Token} \times \text{sum of total punishment of other participants A by B}) \\
 &\quad - \\
 &\quad (\text{received punishment by participant B})
 \end{aligned}$$

$$\begin{aligned}
 &\text{period income of participant B} \\
 &= \\
 &\quad (6 \text{ Token} \times \text{number of contributing participants}) \\
 &\quad + \\
 &\quad (24 \text{ Token}) \\
 &\quad - \\
 &\quad (3 \text{ Token} \times \text{number of acquired pieces of information}) \\
 &\quad - \\
 &\quad (\frac{1}{4} \text{ Token} \times \text{sum of all assigned punishment to participants A})
 \end{aligned}$$

*Control questions*

Please answer the following questions and raise your hand.

*1. Question*

Suppose you are participant A and no participant A has contributed to the common project. Suppose further that no participant A makes use of the possibility to punish. What is your period income if participant B does not acquire further information (please keep in mind that you are endowed with an additional 6 Token in phase 3)?

Your period income (in Token) \_\_\_\_\_



*2. Question*

Suppose you are a participant A and you have contributed to the common project. In addition to you, the other three participants A have also contributed to the project. Suppose further that you are punished by participant B with 24 Token (your period income is reduced by 24 Token). Furthermore no other participant A is punished.

What is your period income? Your period income (in Token) \_\_\_\_\_

*3. Question*

Suppose you receive the information that participant A2 has not contributed to the project.

a) What is the probability that this information about participant A2 is correct? \_\_\_\_\_

b) Do all group members necessarily receive the same information about the contribution of participant A2?

\_\_\_\_\_YES \_\_\_\_\_NO

c) Next period you receive new information about the contribution of participant A2. Does participant A2 necessarily correspond the same actual person as in the previous period?

\_\_\_\_\_YES \_\_\_\_\_NO

*4. Question*

Suppose you are participant B and two participants A have contributed to the common project. Suppose further that you punish two participants with 24 Token (you reduce the income of two participants A by 24 Token). Additionally you acquire one further piece of information for each participant A.

a) What is your period income? Your period income (in Token)\_\_\_\_\_

b) What is the probability that the newly acquired piece of information about participant A2 is correct? \_\_\_\_\_



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## SHORT CURRICULUM VITAE

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YAGIZ ÖZDEMİR

Date of birth: 19 January 1985

### EDUCATION

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Sep 2012 – Oct 2016	University of Zurich <i>PhD Program in Economics</i>
Sep 2010 – Oct 2012	University of Zurich <i>Master of Arts in Economics</i>
Oct 2004 – Sep 2008	University of St. Gallen <i>Bachelor of Arts in Business Administration</i>

### PROFESSIONAL EXPERIENCE

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Since Sep 2016	McKinsey & Company, Zurich <i>Associate</i>
Aug 2008 – Jun 2010	Sal. Oppenheim, Frankfurt a.M. <i>Analyst, Investment Banking Department</i>